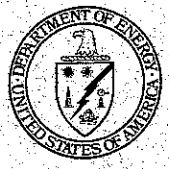
DOE/RL-2005-37
Rev. 0

Status of Hanford Site Risk Assessment Integration, FY 2005



United States
Department of Energy

DOE/RL-2005-37
Rev. 0

Status of Hanford Site Risk Assessment Integration, FY 2005

May 2005

United States Department of Energy

P.O. Box 550, Richland, Washington 99352

EXECUTIVE SUMMARY

Cleanup and closure of the Hanford Site will be achieved in a manner that is protective of human health and the environment. This will be possible because decisions for achieving this objective will be made, in part, based on a series of risk assessments. These risk assessments have been or will be prepared to support evaluations and the selection of solutions to remediate and close waste sites and to dispose of waste in a manner that will be compliant with environmental regulations.

This document presents a review of the major risk assessments currently being conducted at the Hanford Site. It identifies how the assessments now align through the use of a conceptual, integrated risk assessment model that demonstrates the inputs and outputs of the risk assessments, schedule ties, and geographic coverage. Several key points and issues have been identified that provide an initial focus on the challenges associated with developing and implementing an integrated risk assessment process, including the following:

- Different risks are being evaluated – The time frames range from current to short-term (1,000 years) to long-term (10,000 years). Are they comparable, what is the appropriate hierarchy of the assessments, and when is it appropriate for the assessment to be conducted?

- Schedule realignments – In some cases, information from one assessment to support another assessment is not available when needed.

- Exposure scenarios – There are inconsistencies in the exposure scenarios used across some of the assessments.

- Cumulative risk assessments – Cumulative or composite analysis of risk means different things within different regulatory regimes and is viewed differently by different groups. The views and expectations of regulatory, stakeholder, and the Tribal for cumulative risk assessments for the Hanford Site and the requirements of the different regulatory

regimes (e.g., *National Environmental Policy Act of 1969; Comprehensive Environmental Response, Compensation, and Liability Act of 1980;* U.S. Department of Energy [DOE] orders) need to be further explored and understood.

The DOE (Richland Operations Office and Office of River Protection) has established a Configuration Management Group (CMG). The CMG has been tasked with assembling the common set of information and the reasonable range of parameters and assumptions for risk assessments being conducted or planned across the Hanford Site.

Technical guidance documents are to be prepared by the various projects for risk assessments that are or will be conducted in support of Hanford Site waste cleanup programs. The CMG is responsible for reviewing the parameters and assumptions proposed for each risk assessment or group of risk assessments to ensure that there is general consistency among risk assessments at the Hanford Site. In order to begin the process of establishing the common set of information and reasonable range of parameters, technical guidance documents for several projects have been prepared and reviewed by the CMG. These include the *Draft Environmental Impact Statement for the Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, Washington* (DOE 2005), *Composite Analysis for Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site* (PNNL 1998), *Retrieval Performance Evaluation for Single-Shell Tanks S-112 and S-102* (FH 2001), and *Annual Summary of the Integrated Disposal Facility Performance Assessment for 2004* (DOE-ORP 2005).

This initial effort was conducted between the DOE (i.e., the CMG) and a technical working group composed of the contractors responsible for the work. The status of risk assessments presented here is based on information obtained from the existing risk assessment integration technical working group with representatives from all of the major projects/programs on the Hanford Site. The CMG and the technical working group formulated an initial risk assessment integration process (illustrated in Figure ES-1) to improve and guide the development of integrated risk assessments at the Hanford Site.

A workshop was held on April 19, 2005, to discuss Draft A of this document and an initial path forward identified to improve the integration of the risk assessments with a goal of achieving completeness and efficiency in conducting risk assessments to support cleanup and closure of the Hanford Site. The next step to be followed by the CMG will be to work with the regulators, stakeholders, and Tribes to openly discuss and further develop the common set of information and range of parameters and assumptions for risk assessments. This effort will be conducted as part of the partnering and communication program for further development of the risk integration process.

The initial path forward in this process will involve (1) the CMG and a smaller risk integration working group evaluating the schedules, linkages, and gaps and alignment of risk assessments with closure decision requirements across the site; and (2) a series of workshops with stakeholders, Tribes, and the Natural Resource Trustee Council to obtain their ideas and input and discuss the integration of site decisions, cumulative analyses, and risk assessment parameters and assumptions.

Figure ES-1. Hanford Site Risk Assessment Integration.

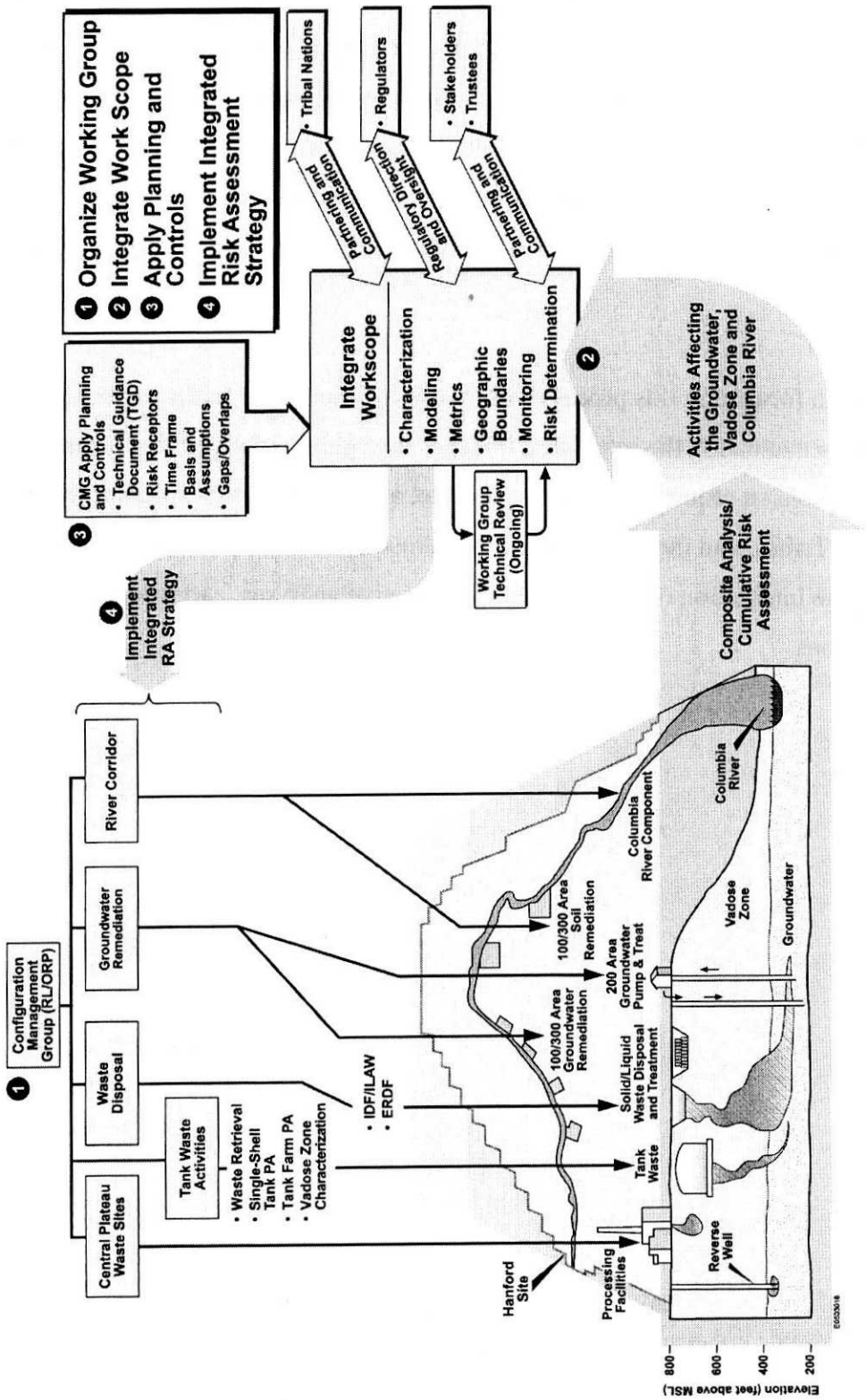


TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

ACRONYMS

AEA	*Atomic Energy Act of 1954*
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
CFR	*Code of Federal Regulations*
CMG	Configuration Management Group
DOE	U.S. Department of Energy
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
LLW	low-level waste
NEPA	*National Environmental Policy Act of 1969*
OU	operable unit
RCRA	*Resource Conservation and Recovery Act of 1976*
SAC	System Assessment Capability
SST	single-shell tank
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and disposal
TWRWP	tank waste retrieval work plan
WAC	*Washington Administrative Code*
WMA	waste management area

1.0 INTRODUCTION

Cleanup and closure of the Hanford Site will be achieved in a manner that is protective of human health and the environment. This will be possible because decisions for achieving this objective will be made, in part, based on a series of risk assessments. These risk assessments have been or will be prepared to support evaluations and the selection of solutions to remediate and close waste sites and to dispose of waste in a manner that will be in compliance with environmental regulations.

The purpose of this document is to summarize the scope and requirements of risk assessments, describe the schedule and status of the major individual risk assessment projects currently under way, identify the interfaces between the programs and projects that are developing risk assessments, and propose a process that will address issues identified in this report. In meeting these objectives, this document presents information on current risk assessments being conducted across the Hanford Site, shows the geographical boundaries of the risk assessments, presents a combined schedule that details the relationships between the various risk assessments, highlights risk assessment gaps for future action, and provides a process for integrating risk assessments.

2.0 BACKGROUND

The Hanford Site contains a wide range of radioactive, mixed, and hazardous wastes. Ongoing investigations are being conducted in response to regulations established to ensure that remediation and closure actions are protective of human health and the environment. These regulatory drivers include, but are not limited to, the following:

- *Atomic Energy Act of 1954* (AEA), as implemented by DOE O 435.1
- *National Environmental Policy Act of 1969* (NEPA)
- *Resource Conservation and Recovery Act of 1976* (RCRA)
- *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA)
- "Model Toxics Control Act – Cleanup" (*Washington Administrative Code* [WAC] 173-340)
- *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et. al. 1989).

Numerous risk assessments and performance assessments are being conducted to support decisions to be made as part of the U.S. Department of Energy's (DOE's) responsibility under

these regulatory drivers. The scope of these assessments is focused on addressing specific projects that are targeted with the responsibility of remediating, closing, or disposing of hazardous, mixed, and low-level waste (LLW) and waste sites. The assessments are designed to provide information that will support specific decisions within a limited scope of interests. Additionally the scope of the Hanford Sitewide Monitoring Program and the Orphan Sites Program are included as part of this report. Risk assessment principals and practices draw upon many sources. The DOE believes that, although the contaminated areas of the Hanford Site are well defined, continued data collection and analysis of areas not suspected as being contaminated through these two programs is an integral part of the risk characterization process, and it is appropriate to include these efforts as part of this status report on risk assessments.

In October 2004, the DOE began an effort to integrate risk assessment strategies and schedules. This effort, in part, is to evaluate how the individual risk assessments integrate collectively in an overall assessment of Sitewide risk and to assess the need for a broad-based, cumulative Sitewide risk assessment. The focus of the integration effort is the groundwater operable unit (OU) and source sites to be closed under CERCLA, RCRA, and the AEA. Other related risk assessments are being performed in support of NEPA, closure under *Revised Code of Washington* 70.105, and the Sitewide composite analysis that is required under DOE O 435.1. In all, 51 assessments are currently under way to address risks to human health and the environment from hazardous, mixed, or radioactive wastes.

3.0 RISK ASSESSMENTS AT THE HANFORD SITE

Risk assessments provide information that is used by the DOE and the regulators in making decisions and selecting methods to remediate or close waste sites and to dispose of wastes at the Hanford Site. For the purposes of this document, the term "risk assessment" is used to include a range of studies that evaluate human health and ecological risks from radioactive, mixed, and hazardous wastes. The term includes risk assessments, performance assessments, and composite analyses.

Risk assessments are prepared to support decisions under RCRA, CERCLA, the AEA, and NEPA and focus on evaluating the human health and ecological risks posed by hazardous wastes, waste sites, and contaminated facilities. The RCRA decisions address sites that would receive planned releases and the closure of treatment, storage, and disposal (TSD) facilities and past-practice sites that have been contaminated by unplanned releases of hazardous substances. The CERCLA decisions select a cleanup remedy for facilities and sites that have been contaminated. Decisions under the AEA involve closure of sites containing low-level radioactive waste (LLW) and disposal of LLW. NEPA supports the decision-making process that requires federal agencies to evaluate and compare the potential environmental impacts of the proposed action(s) and alternatives prior to implementing a major action. Risk assessments prepared to support reviews under NEPA provide information on the potential impacts to human health and the environment.

The Tri-Party Agreement provides the framework for permitting TSD units and promoting an effective investigation and cleanup of contamination at the Hanford Site. It establishes a procedural framework and schedule for developing, prioritizing, implementing, and monitoring response actions at the Hanford Site in accordance with CERCLA and CERCLA guidance, the "National Oil and Hazardous Substances Pollution Contingency Plan" (also referred to as the National Contingency Plan) (40 *Code of Federal Regulations* [CFR] 300.430[e][9][iii]), and RCRA and RCRA guidance.

One of the purposes of the Tri-Party Agreement is "to ensure that the environmental impacts associated with past and present activities at the Hanford Site are thoroughly investigated and that appropriate response actions are taken as necessary to protect the public health, welfare, and the environment" (Ecology et. al. 1989). Section 6.0 of the Tri-Party Agreement discusses the requirements of RCRA and the State of Washington Hazardous Waste Management Act that pertain to all units that were used to store, treat, or dispose of RCRA hazardous waste. Section 7.0 discusses the cleanup of past-practice units that will be undertaken in accordance with the CERCLA process or RCRA process.

In both processes, the key initial step is to conduct an investigation that will define the nature and extent of contamination through field sampling and laboratory analysis. This will include characterization of waste types, volume, concentration ranges, fate and transport of contaminants, migration routes, and potential receptors. It is anticipated that because of limited data during the initial investigation to adequately assess risk, including environmental pathways and expected exposure levels, the analysis will be developed further during subsequent studies.

3.1 RESOURCE CONSERVATION AND RECOVERY ACT OF 1976

The *Solid Waste Disposal Act* was signed into law in 1965 and was amended by the *Hazardous and Solid Waste Amendments of 1984*. The objectives of the Act, as amended, are to conserve valuable material and energy resources by ensuring that hazardous waste management practices are conducted in a manner that is protective of human health and the environment, also requiring that hazardous wastes are properly managed in the first instance, thereby reducing the need for corrective action at a future date. The Act also requires minimizing the generation of hazardous waste and land disposal of hazardous waste by encouraging process substitution, materials recovery, and properly conducted recycling, reuse, and treatment. Important portions of RCRA include Subtitle C, "Hazardous Waste Management"; Subtitle D, "Solid Waste Management"; and Subtitle I, "Underground Storage Tanks." The Washington State Department of Ecology (Ecology) has been authorized by the U.S. Environmental Protection Agency (EPA) to carry out the provisions of RCRA.

The tank farms in the 200 East and 200 West Areas of the Hanford Site are operated and managed as TSD facilities under RCRA. In addition, unplanned release sites within the tank farms are being investigated and are expected to be remediated as RCRA past-practice waste sites, as implemented in accordance with the Tri-Party Agreement (Ecology et al. 1989). Through the implementation of RCRA, decisions will be made to define the method to close

149 single-shell tanks (SSTs) and 28 double-shell tanks as TSD facilities or RCRA past-practice sites. In addition to storing hazardous wastes, the tank farms also store radioactive waste, which is regulated under the AEA, as implemented by DOE O 435.1. In addition to the closure of the SSTs and double-shell tanks, RCRA is also applicable to other disposal sites at Hanford, including the mixed waste cells at the Solid Waste Burial Grounds and the Integrated Disposal Facility. The RCRA decisions concerning closure of TSD facilities will address the hazardous waste aspects of closure and disposal, and DOE O 435.1 will be applied to address the radioactive waste aspects of closure and disposal.

3.2 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980

CERCLA was enacted in 1980 and amended in 1986 to provide for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and the cleanup of inactive hazardous waste disposal sites. The statute authorizes response actions whenever any hazardous substance is released or there is a substantial threat of release into the environment that may present an imminent and substantial threat to public health or welfare. CERCLA required the promulgation of the National Contingency Plan (40 CFR 300.430[e][9][iii]), which established procedures and standards for responding to releases of hazardous substances, pollutants, and contaminants.

CERCLA requires the preparation of a baseline risk assessment that defines the potential threat to human health and the environment posed by the site. The level of risk posed by the site is one element in making an informed risk-management decision regarding the need for a remedial action. The EPA published *Risk Assessment Guidance for Superfund Volume 1, Human Health Evaluation Manual, Interim Final* (EPA 1989a) and *Risk Assessment Guidance for Superfund Volume 2, Environmental Evaluation Manual* (EPA 1989b), which contain detailed guidance for conducting baseline risk assessments. The RCRA corrective action program uses a process similar to CERCLA risk assessment for determining the need for interim measures and to set action levels or media cleanup standards for contaminants without promulgated standards. The following text provides summary information regarding baseline risk assessments; in general, this discussion is applicable to RCRA risk assessments.

According to the EPA's *Risk Assessment Guidance for Superfund Volume I* (EPA 1989a), the principal objective of the baseline risk assessment is to collect sufficient data to identify and characterize the following:

- Concentrations and toxicity of contaminants present in each medium
- The environmental fate and transport mechanisms of these contaminants
- Potential human and environmental receptors
- Potential exposure routes and the extent of actual or potential exposure
- Extent of expected impacts and the likelihood of such impacts occurring
- Level of uncertainty of the baseline risk assessment.

The final step in the baseline risk assessment is the actual characterization of the risk posed to human health and the environment. Using the information from the identification, exposure, and toxicity assessments, the collected information is integrated to provide an estimate of the risk posed to human health and the environment. Specific information on this process can be found in Chapter 8 of the EPA guidance document *Risk Assessment Guidance for Superfund Volume 1* (EPA 1989a).

The National Contingency Plan (40 CFR 300.430[e][9][iii]) establishes nine evaluation criteria to assess the merit of each remedial alternative. These criteria, which are described in detail in EPA's remedial investigation/feasibility study guidance (EPA 1988), require that each remedial alternative be evaluated on the basis of the following:

1. Threshold criteria:

   - Overall protection of human health and the environment
   - Compliance with applicable or relevant and appropriate requirements.

2. Primary balancing criteria:

   - Long-term effectiveness and permanence of the remedy
   - Reduction of the toxicity, mobility, and volume of the contaminants present at the site
   - Short-term effectiveness of the remedy (i.e., protectiveness during implementation)
   - Implementability of the remedy
   - Cost of the remedy.

3. Modifying criteria:

   - State acceptance of the selected alternative
   - Community acceptance of the selected alternative.

Under the first evaluation criterion, the ability of each alternative to provide protection of human health and the environment is assessed. This criterion draws on the baseline risk assessments (i.e., human health and ecological) and evaluations of other criteria, particularly the long- and short-term effectiveness evaluations.

The CERCLA decisions concerning the remediation of facilities are the responsibility of the EPA, in consultation with Ecology, as defined in the Tri-Party Agreement (Ecology et al. 1989).

3.3 ATOMIC ENERGY ACT OF 1954, AS IMPLEMENTED BY DOE O 435.1

The closure of facilities that store or are contaminated with radioactive waste and facilities that will be used to dispose of LLW is regulated under the AEA. The DOE facilities that dispose of

LLW and the closure of radioactive waste sites must comply with AEA requirements concerning closure and disposal, as implemented by DOE O 435.1, unless addressed by other regulations. The assessment of human health risks associated with closure and disposal of LLW requires the preparation of performance assessments and, on a Sitewide basis, a composite analysis. Because CERCLA risk assessments may address cleanup of mixed waste sites, in some cases CERCLA risk assessments may be used in lieu of preparing a performance assessment. DOE M 435.1-1 and DOE G 435.1-1 provide further explanation on when this may be appropriate.

Performance assessments and the composite analysis are being prepared to support a variety of decisions, including the disposal of LLW and closure activities for the deactivation of high-level waste facilities/sites that require the review/approval of site closure plans. The assessments of the projected performance of each unit to be closed and the assessment of the projected composite performance of all units to be closed are critical to deactivated high-level waste facility closure activities.

3.4 TANK FARM ASSESSMENT INTEGRATION THROUGH THE TRI-PARTY AGREEMENT APPENDIX I PROCESS

Tank waste retrieval work plans (TWRWPs) will be prepared for a tank or set of tanks and their associated ancillary equipment. The TWRWPs may cover tanks, tanks and associated ancillary equipment, or ancillary equipment alone (as may be required). The TWRWPs address only those actions associated with waste retrieval. As well as other information, TWRWPs include a pre-retrieval risk assessment that is based on available data and the most sophisticated analysis available at the time. The purpose of this risk assessment is to aid in making operational decisions during retrieval activities. This risk assessment will not be used to make final retrieval or closure decisions.

Ecology, EPA, and DOE have elected to develop and maintain, as part of the SST system closure plan, one performance assessment for the purpose of evaluating whether SST system closure conditions are protective of human health and the environment for all contaminants of concern (both radiological and nonradiological). This performance assessment will document, by reference, all relevant performance requirements defined by RCRA, CERCLA, the Hazardous Waste Management Act (*Revised Code of Washington* 70.105), the *Clean Water Act of 1977,* the *Safe Drinking Water Act of 1974*, and the AEA. A performance assessment is larger in scope than a risk assessment required solely for nonradiological contaminants. This eliminates a duplicative functional requirement, as well as a duplicative documentation requirement. A performance assessment will be developed for each waste management area (WMA) and will incorporate the latest information available. The performance assessments will be approved by Ecology and DOE pursuant to their respective authorities and will be incorporated, by reference, into the Sitewide permit through closure plans.

As individual components are retrieved or characterized, or as other component closure activities are completed, the resulting component characterization information will be incorporated into the WMA performance assessment to determine its relative risk compared to the performance of the

entire WMA. As each WMA proceeds toward closure, its respective performance assessment will be updated to address all pertinent new results and findings. Final WMA closure decisions will be made after all components are retrieved and/or characterized, all other component closure activities have been completed, and a final WMA performance assessment is completed.

For disposal decisions, DOE-Headquarters will conduct a technical review of the performance assessment for disposal actions, which includes determining the adequacy of these analyses to establish the expected performance of the closed facility/site; the potential hazards; and the activities necessary to protect members of the public, the workers, and the environment. The review and approval of the assessment/analysis is to ensure that the assumptions regarding source term, leach rates, transport mechanisms, analytical transport models, hydrologic and other critical aspects of the site, effectiveness of any barriers to migration of radionuclides on which performance is based, and other key assumptions are supported by the available data. Furthermore, uncertainties associated with the key assumptions and data are addressed through identification of compensatory measures, through combinations of conservatism in the estimates, defense-in-depth, or other appropriate measures. The review specifically examines and documents the conclusions of the review with respect to the adequacy of each of these key assumptions.

Performance assessments are conducted to demonstrate that there is a reasonable expectation that LLW disposed at a DOE facility will not result in exceeding the LLW disposal facility performance objectives identified in DOE M 435.1-1, Chapter II for high-level waste requirements; Chapter III for transuranic requirements; and Chapter IV for LLW requirements, as well as related performance measures associated with protection of the public from disposed LLW. The SST farms in the 200 Areas of the Central Plateau are expected to be closed in accordance with DOE O 435.1 as LLW disposal sites, as well as in accordance with RCRA and WAC 173-303, "Dangerous Waste Regulations."

Composite analyses are conducted as a planning tool to analyze the interaction of other radioactive source terms at a site (as well as the LLW disposal facility), to minimize the likelihood that current LLW disposal activities will result in the need for future corrective or remedial actions, and to protect the public and environment, consistent with DOE limits on total allowable public doses of radiation from all sources. Performance assessments and composite analyses are reviewed to determine that they are complete, comprehensive, reflective of site- and facility-specific conditions, supported by appropriate rationale, and, therefore, defensible.

3.5 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

NEPA was enacted in 1969 and became effective in January 1970. The purpose of NEPA is to ensure that potential environmental impacts are considered during federal agency decision making. NEPA requires that impacts to human health and the environment are evaluated for proposed federal actions and for reasonable alternatives. Risk assessments based on realistic exposure conditions can aid in the evaluation of human health impacts during the NEPA process and are occasionally referenced or partially incorporated in DOE NEPA documents. Under the

DOE NEPA implementing procedures (found in 10 CFR 1021, "National Environmental Policy Act Implementing Procedures"), most proposed federal actions require a NEPA review. An exception is usually made for actions taken under CERCLA; the DOE instead relies on the CERCLA documentation, requiring that NEPA values (e.g., analysis of cumulative, ecological, and socioeconomic impacts) be incorporated to the extent practicable in CERCLA documents.

3.6 HANFORD SITE RISK ASSESSMENT WORKSHOP REVIEW

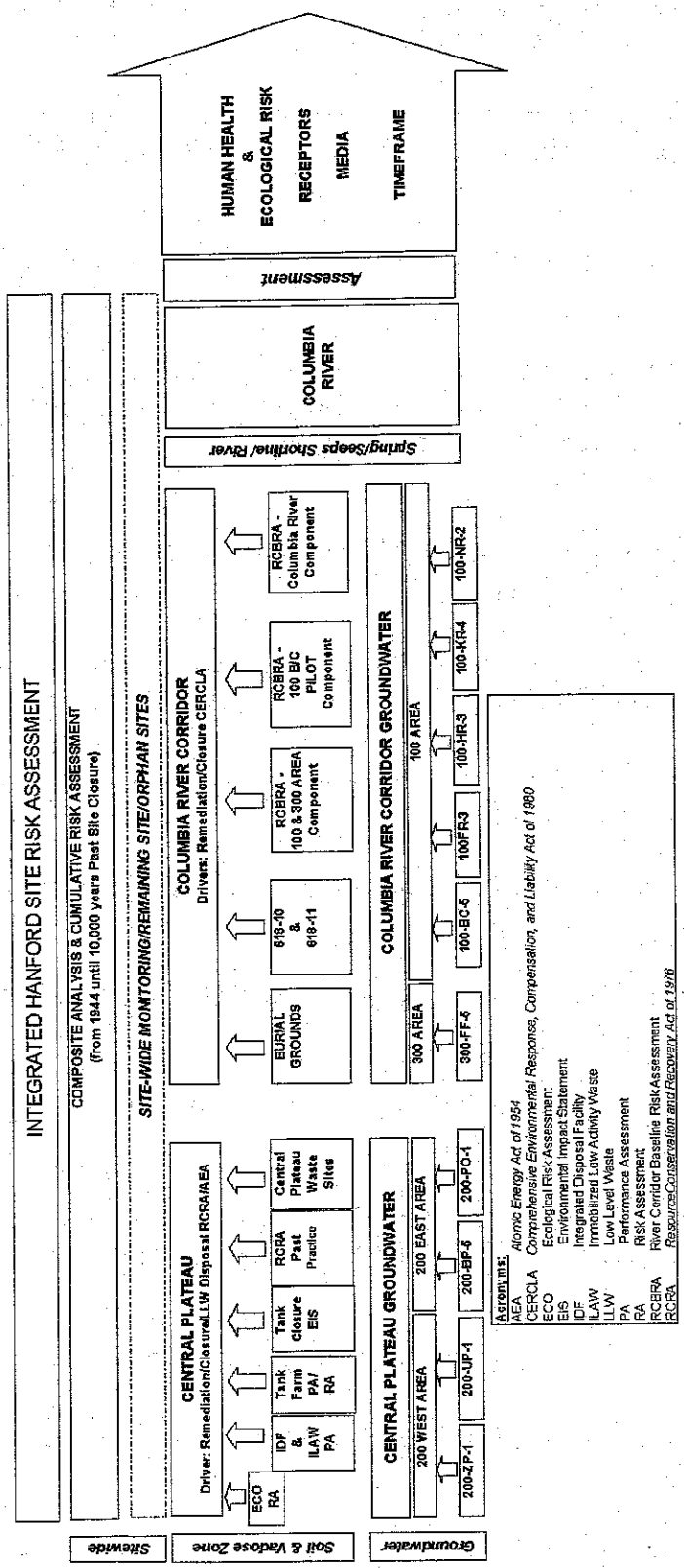
As part of the development of this document, a 2-day workshop was held on January 19 and 20, 2005, which brought together the DOE, Richland Operations Office; the DOE, Office of River Protection; and contractors involved in the development and preparation of risk assessments, performance assessments, and composite analyses at the Hanford Site. During the workshop, a review of all risk assessments and performance assessments under way (either planned or recently completed) was conducted. This workshop resulted in the development of a detailed matrix that summarized the scope of the various assessments. This matrix is presented in Appendix A. A review of the matrix has led to the following key questions:

- What decision concerning remediation, closure, or disposal is the risk assessment supporting?
- What is the analysis pathway and assessment endpoint?
- What are the target risk assessment receptors?
- What is the media pathway to the endpoint?
- What are the supporting integrating inputs/outputs of the assessment in addition to the decision?
- What inputs/outputs are not clearly defined and may require further definition in order to better define integration among other assessments and across the Hanford Site?

To address these questions, a conceptual model of the Hanford Site's assessments has been developed and is shown in Figure 1. The model illustrates both a vertical and horizontal integration across the Site. The conceptual model is organized to portray the following structure:

- The composite analysis is shown as the integrating assessment across the Site, with supporting inputs from the various assessments being conducted on the Central Plateau and along the Columbia River Corridor.
- The data collection efforts of the Hanford Sitewide Monitoring Program/remaining sites assessments and the orphan sites determinations are supporting all of the assessments.

Figure 1. Graphical Representation of the Integrated Hanford Site Risk Assessments.



- The various risk assessments are associated with the respective geographic areas of the Central Plateau and the River Corridor and vertically portray their respective focus areas (i.e., near-surface soils, vadose zone, or groundwater).

- The exposure points of receptors are captured through soil, groundwater, and groundwater emergence into the Columbia River, and the Columbia River, including sediments as well as surface water.

- The final assessment outputs are illustrated in the output arrow at the right-hand side of the model.

During the course of the workshop review, numerous assessments independent of the current cleanup and closure activities were identified. Detailed information on these assessments was not reported in either the integrated schedule or matrix. A partial listing of past assessments is as follows:

- *Final Feasibility Study for the Canyon Disposition Initiative (221-U Facility)*, DOE/RL-2001-11, Rev. 1 (DOE-RL 2004)

- *Remedial Investigation and Feasibility Study Report for the Environmental Restoration Disposal Facility (ERDF)*, DOE/RL-93-99, Rev. 1 (DOE-RL 1994)

- *Composite Analysis for Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site*, PNNL-11800 (PNNL 1998)

- *Retrieval Performance Evaluation Methodology for the AX Tank Farm*, DOE/RL-98-72, Rev. 0 (DOE-RL 1999)

- *Retrieval Performance Evaluation for Single Shell Tanks S-112 and S-102*, HNF-7644 (FH 2001)

- *Performance Assessment for the Disposal of Low-Level Waste in the 200 West Area Burial Grounds*, WHC-EP-0645 (WHC 1995)

- *Tank Waste Remediation System, Hanford Site, Richland, Washington, Final Environmental Impact Statement*, DOE/EIS-0189 (DOE and Ecology 1996)

- *Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement, Richland, Washington*, DOE/EIS-0286F (DOE 2004)

- *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, DOE/EIS-0222-F (DOE 1999)

- Cleanup verification packages, including risk assessments (see Appendix B)

A partial listing of assessments independent of the current closure activities are as follows:

- Decontamination and decommissioning; State-Approved Land Disposal Structures and K Basins
- Decontamination and decommissioning; 100 Area Reactor Remedial Actions
- Central Landfill
- Radiological release (Fitzner-Eberhardt Arid Lands Ecology Reserve/North Slope/River Ranch)
- Energy Northwest
- Laser Interferometer Gravitational Wave Observatory
- Fast Flux Test Facility
- US Ecology.

3.7 FINDINGS OF HANFORD SITE RISK ASSESSMENT WORKSHOP REVIEW

Based on the workshop review, several key points and issues have been identified that provide an initial focus for implementing an integrated risk assessment process:

- Different risks are being evaluated – The time frames range from current to short-term (1,000 years) to long-term (10,000 years). Are they comparable, what is the appropriate hierarchy of the assessments, and when is it appropriate for the assessment to be conducted?
- Schedule realignments – In some cases, information from one assessment to support another assessment is not available when needed.
- Exposure scenarios – There are inconsistencies in the exposure scenarios used across some of the assessments.
- Cumulative risk assessments – Cumulative or composite analysis of risk means different things within different regulatory regimes and is viewed differently by different groups. The views and expectations of regulatory, stakeholder, and Tribal groups for cumulative risk assessments for the Hanford Site and the requirements of the different regulatory regimes (e.g., NEPA, CERCLA, DOE orders) need to be further explored and understood.

The most notable issues raised during the workshop review are how the data outputs from all of the risk assessments feed into the composite analysis and the cumulative risk assessments, and

what is expected of the output of the composite analysis and cumulative risk assessment based on these inputs. This issue is discussed further in Section 6.0, with a proposed resolution on how these two assessments can serve as the integrating assessment across the Hanford Site.

Baseline risk assessments are being prepared, which are defined under CERCLA. The linkages to CERCLA decisions are well defined for the baseline assessments. For example, the Columbia River Corridor baseline risk assessment is an important assessment for defining current risk conditions; however, how this information will support future decisions should be more clearly defined.

4.0 GEOGRAPHIC BOUNDARIES OF THE RISK ASSESSMENTS

The current risk assessments, as illustrated in the figures in Appendix C, cover a variety of areas across the Hanford Site. The geographic endpoints of the risk assessment are consistent relative to the areas of interest and the decisions that the risk assessments are supporting. The geographic endpoints include near-surface soils for human health and ecological risks, soil/ vadose zone for human health risks, groundwater for human health risks, seeps/springs/riparian areas along the Columbia River for human health and ecological risks, and the Columbia River for human health and ecological risks.[1]

The current approach to evaluate air release is based on the defined area of impact. In most cases, these areas would be defined by surface contamination based on site characterization work. The boundaries shown in Appendix C are the current estimated configuration of the plumes.

The geographic study boundaries of some risk assessments are not completely defined (e.g., impacts from air emissions). The current approach is to evaluate air releases based on the defined area of impact. In most cases, these areas would be defined by surface contamination based on site characterization work. The approximated boundaries shown in Appendix C are designated with dashed lines.

A cross-section of geographic study boundaries is also included in Appendix C. The cross-sections are divided by human health and ecological risk assessments to provide a starting point for developing integration.

The Hanford Sitewide Monitoring Program and the Orphan Sites Program provide essential data to fill in gaps between the risk assessment study boundaries. As noted earlier, the DOE believes

[1] The scope of the groundwater risk assessments is to define risks to human receptors from contacting or ingesting the groundwater via a man-created pathway (i. e., wells), and not through a natural pathway (seeps and springs). Human health and ecological risk from groundwater exposure is assessed at the point of natural pathways to the surface, which would include seeps, springs, and wetlands. Transition zones at these interface points where groundwater becomes surface water are included in these later assessments.

that, although the contaminated areas of the Hanford Site are well defined, continued data collection and analysis of areas not suspected as being contaminated through these two programs is an integral part of the risk characterization process, and it is appropriate to include these efforts as part of this status report on risk assessments. Ongoing monitoring provides data for areas that are not addressed by focused, specific projects and can be used to locate unknown waste sites. Also, when the specific project's responsibility for a focused risk assessment has been met, the Hanford Sitewide Monitoring Program will provide long-term, ongoing monitoring. The Orphan Sites Program is a historical document review and a field walkdown of large operational areas to determine if all of the waste sites have been addressed. New sites that are discovered by either program are entered into the Waste Information Data System database for further evaluation and disposition.

5.0 SCHEDULE INTEGRATION

During the development of this report, scheduling data were assembled for the risk assessments that are currently under way at the Hanford Site. As part of this compilation of information, a composite schedule was developed. The schedule presents the major tasks that support the risk assessments, identifies the key milestones that the assessments are supporting, and identifies the input and output linkages between assessments that are required to complete individual risk assessments. This composite schedule, presented in Figure 2, provides the foundation for the Configuration Management Group (CMG) and the technical working group to begin refining schedule integration needs, to determine where and if actual conflicts in input and output requirements exist, and to determine what corrective actions may need to be taken.

Based on this composite schedule, there appear to be instances in which input links to an assessment will not be available in a timely manner to complete that assessment. The dependent risk assessments and the source information assessments that fall into this category are presented in Table 1.

6.0 CUMULATIVE RISK ASSESSMENT

This section describes the need for and scope of a Sitewide risk assessment (or cumulative risk assessment) that should be developed and maintained to support waste site-specific or OU-specific risk assessments, including those conducted under CERCLA and RCRA. Currently, a composite analysis is required by DOE O 435.1 to assess the cumulative impacts of all LLW disposal and closure actions at the Hanford Site, but only for radionuclides. To evolve into a Sitewide risk assessment, the composite analysis could be expanded to include chemical constituents and a broader range of exposure scenarios. This section provides an initial specification for developing and maintaining a Sitewide risk assessment that would support decision making at the Hanford Site and ensure an integrated Sitewide assessment reflecting individual site- or waste-specific risk assessments.

Figure 2. Hanford Site Risk Assessment Composite Schedule. (3 Pages)

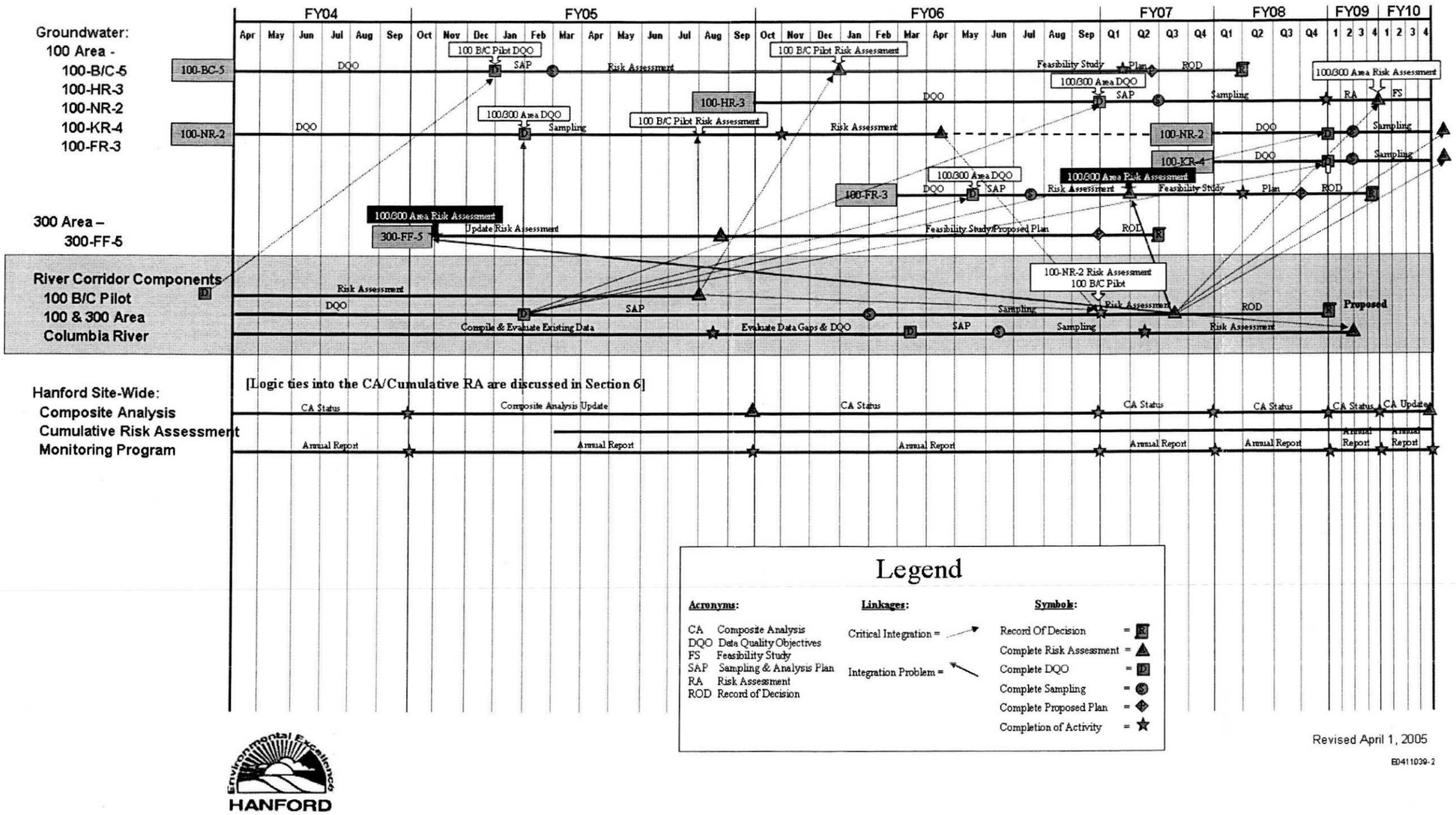


Figure 2. Hanford Site Risk Assessment Composite Schedule. (3 Pages)

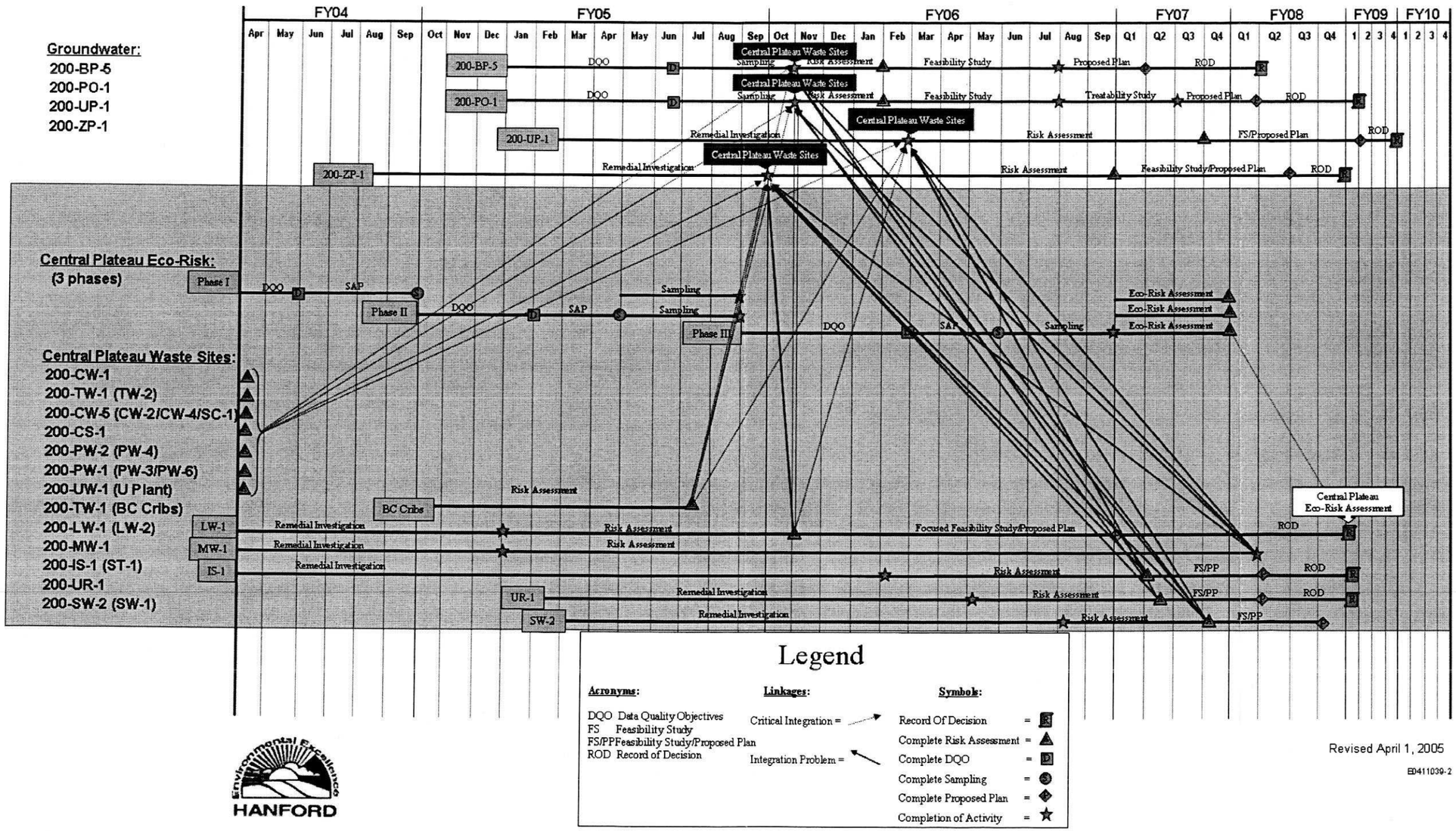


Figure 2. Hanford Site Risk Assessment Composite Schedule. (3 Pages)

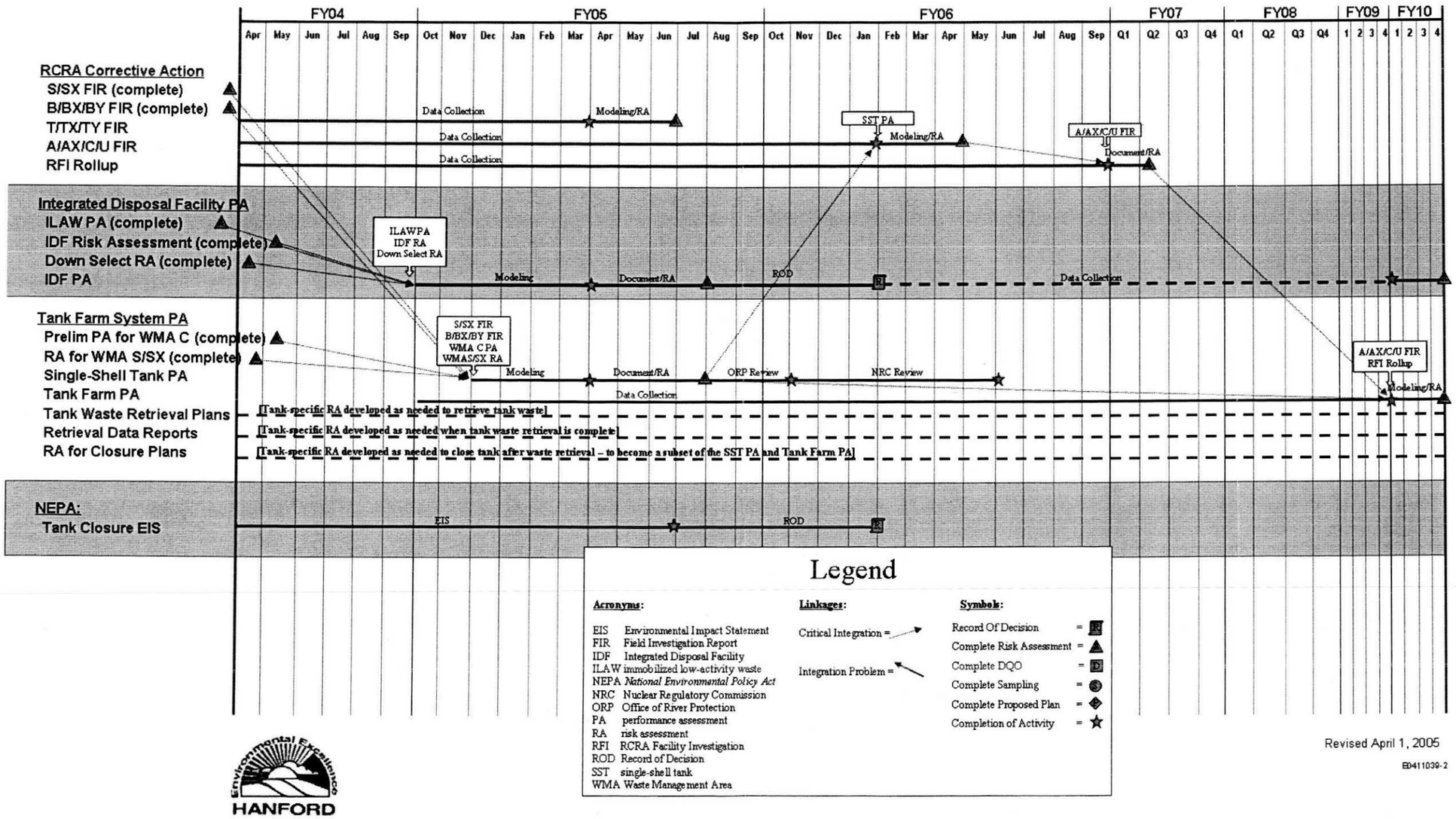


Table 1. Data Input Schedule Conflicts.

Risk Assessments with Data Input Dependency Problems Based on Current Schedules	Source Assessment Providing Data Inputs Later Than Required Based on Current Schedules
200-ZP-1 and 200-UP-1 Groundwater Operable Unit	Central Plateau waste sites (200-LW-1, 200-MW-1, 200-IS-1, 200-UR-1, 200-SW-1)
300-FF-5 and 100-FR-3 Groundwater Operable Unit	100/300 Area of River Corridor baseline risk assessment

6.1 NEED FOR A SITEWIDE RISK ASSESSMENT

A Sitewide risk assessment for the Hanford Site has not been formally chartered. The System Assessment Capability (SAC), however, includes a set of tools that could be adapted to this need. The SAC tools are currently being used to perform the composite analysis as required by DOE O 435.1. This section addresses the specific drivers for development and application of a Sitewide risk assessment.

The specific regulatory drivers for a Sitewide risk assessment include the following:

- Specific requirements for and scope of a composite analysis, as required by DOE O 435.1.

  {From DOE M 435.1-1, Chapter IV.P(3), "Composite Analysis."} "For disposal facilities which received waste after September 26, 1988, a site-specific radiological composite analysis shall be prepared and maintained ***that accounts for all sources of radioactive material that may be left at the DOE site and may interact with the LLW disposal facility,*** contributing to the dose projected to a hypothetical member of the public from the existing or future disposal facilities" (emphasis added). Additional requirements address the performance objectives, period of calculation, need for review and revision as information changes, and the need for an annual determination of the adequacy of the composite analysis. The composite analysis is not required to address nonradiological impacts and assesses only human health impacts. The composite analysis also does not address intruder scenarios, as these are addressed through disposal facility-specific performance assessments.

- Cumulative impacts analysis within CERCLA.

  CERCLA requires that a baseline risk assessment be performed to assess the "cumulative site risk to an individual using reasonable maximum exposure assumptions" (OSWER Directive 9355.0-30 [EPA 1992]). The baseline risk assessment also is applicable to ecological receptors as well. In the CERCLA context, "cumulative risk" generally means "the combined risks from aggregate exposures to multiple agents or stressors." (EPA 2003). The EPA recently published the *Framework for Cumulative Risk Assessment* (EPA 2003) as the first step in a long-term effort to develop guidelines for conducting a cumulative risk assessment.

- Analysis of cumulative impacts analysis for NEPA actions.

  NEPA requires the assessment of "cumulative impact," which is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). The Hanford Site's solid waste environmental impact statement (DOE 2004) included a cumulative analysis of groundwater and Columbia River impacts simulated with the SAC tool for technetium-99, iodine-129, and uranium-238.

- DOE policy requiring that CERCLA documents include NEPA values, including provision of a cumulative impacts analysis.

  {From June 1994, DOE Secretarial Policy on NEPA [DOE 1994].} "To facilitate meeting the environmental objectives of the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) and respond to concerns of regulators, consistent with the procedures of most other Federal agencies, the Department of Energy hereafter will rely on the CERCLA process for review of actions to be taken under CERCLA and will address NEPA values and public involvement procedures as provided below... Department of Energy CERCLA documents will incorporate NEPA values, such as analysis of cumulative, offsite, ecological, and socioeconomic impacts, to the extent practicable."

  "Incorporate NEPA values such as analysis of cumulative, off-site, ecological, and socio-economic impacts, to the extent practicable, in DOE documents prepared under the *Comprehensive Environmental Response, Compensation, and Liability Act*." (DOE O 451.1B.5.a[13])

  Accordingly, the Hanford Site's CERCLA documents typically include NEPA values, including cumulative impacts.

In addition to these regulatory drivers, common sense would indicate that for a site as complex as Hanford (i.e., approximately 1,000 sources, a dozen or more existing groundwater plumes, and extensive ongoing waste disposal actions) and geographically large (i.e., several hundred square miles of potentially affected environment), some analysis would be required from a holistic perspective of potential cumulative impacts of cleanup, disposal, and closure actions. It is also clear that the groundwater and the Columbia River are natural accumulation points for impacts from multiple sources. A comprehensive risk assessment capability is necessary to address the cumulative impacts on these resources.

Additional rationale for maintaining a Sitewide risk assessment is to force integration and coordination among individual risk assessments. The Sitewide risk assessment would highlight

inconsistencies (or gaps) among the site-specific risk assessments and would provide an opportunity to ensure consistency in risk modeling assumptions and metrics.

6.2 PRELIMINARY SPECIFICATIONS FOR A SITEWIDE RISK ASSESSMENT CAPABILITY

The primary requirements for a Sitewide risk assessment capability include the following:

- Meet the requirements of DOE O 435.1 for a composite analysis addressing LLW disposal and cumulative impacts from the inventories that are expected to remain onsite. Maintain the analysis as new data become available.

- Continue to meet the requirements of DOE O 451.1B to address NEPA values, including cumulative impacts within CERCLA documentation. Update the composite analysis to incorporate the remedies proposed in each CERCLA OU feasibility study and proposed plan.

- Provide reasonably accurate representations of site-specific risk assessments, which must be updated, as appropriate, to account for site-specific risk assessment results.

Although the SAC includes the dominant processes necessary to simulate Sitewide impacts, the SAC has not been applied to all Sitewide issues and does not benefit from a strong link with ongoing and evolving waste site characterization efforts. Specifically, databases supporting assessments performed with the SAC do not include all of the information on nonradioactive constituents that are likely to be significant from a Sitewide perspective (e.g., carbon tetrachloride, chromium, and nitrate/nitrite). To clarify this requirement, it is necessary to assess the contaminants of potential concern that are being addressed by waste site risk assessments and then determine which of those are potentially significant from a "cumulative," or Sitewide, perspective. Secondly, the SAC must be continually updated to incorporate site-specific characterization and risk assessment information that is being generated in response to CERCLA, RCRA, and NEPA actions. The SAC needs to accurately represent the results of detailed assessment and modeling activities.

6.3 PRELIMINARY INTEGRATION PROCESS FOR THE SITEWIDE RISK ASSESSMENT AND SITE-SPECIFIC RISK ASSESSMENTS

Formal interface requirements need to be established between the composite analysis (or future Sitewide risk assessment) and all other Hanford Site risk assessments. Table 2 provides an initial overview of these interface requirements. This table shows the information required by the composite analysis for each risk assessment, typically to support history matching and to enable composite analysis model conditioning to credibly represent site-specific risk assessment results. The last column of Table 2 describes the information that the composite analysis should deliver to each risk assessment, typically either to provide an assessment of cumulative impacts or to

provide aggregated impacts from multiple sources as input to site-specific risk assessments (e.g., 200 Area groundwater plumes that may impact 300 Area groundwater).

Table 2. Interface Requirements for the Composite Analysis and Other Risk Assessments. (2 Pages)

Category of Risk Assessment	What Does the CA Need from Other RAs?	What Should the CA Deliver to Other RAs and How Will RAs Use that Information?
ORP Risk Assessments: • SST PA (closure risk assessments) • IDF PA • RCRA Corrective Action (FIR) • Tank Closure EIS	• Provide field investigation data to the CA to ensure consistent representation of geotechnical site attributes. • Directly incorporate IDF PA release-to-groundwater results into the CA. • Provide flux-to-groundwater results to the CA from both the SST PA and the IDF PA. • Provide reference endstate assumptions (e.g., residual fraction and barrier assumptions) to ensure consistent representation in the CA.	• Provide cumulative impact analysis for SST PA and IDF PA. • Ensure consistency in assumptions for inventory, disposal configuration, etc. • Prepare sensitivity cases that align to selected variations in the reference assumptions.
Central Plateau Source Units: • CERCLA OU RI/FS risk assessments (e.g., TW-1, CW-5, and BC Cribs) • Major facility risk assessments (e.g., U Plant CDI) • Ecological risk assessment	• Provide site-specific contaminant distributions to enable "history matching": – Provide field characterization to enable improved calibration of 1D vadose zone models – Facilitate CA history matching by providing updated information regarding historical releases and inventory estimates. • Update reference closure or remediation configuration (baseline disposition). • Provide release-to-groundwater predictions, if any.	• Provide cumulative impact analysis as context for individual OU or waste site decisions. Provide cumulative impact analysis to support CERCLA requirements. • Ensure consistency in inventory and endstate disposition assumptions. • Provide selected sensitivity cases to represent variations in endstate disposition.
Central Plateau Groundwater OUs: • 200-ZP-1, 200-UP-1, 200-BP-5, and 200-PO-1	• Develop "fine-grid" groundwater model as a refinement of the Sitewide groundwater model and SAC tools. • Provide monitoring and characterization results to enable improved "history matching."	• Provide release to groundwater from all Central Plateau sources to ensure that groundwater decisions reflect potential impacts from all sources and remedies. • Provide cumulative impact analysis as context for individual groundwater OU decisions.

Table 2. Interface Requirements for the Composite Analysis and Other Risk Assessments. (2 Pages)

Category of Risk Assessment	What Does the CA Need from Other RAs?	What Should the CA Deliver to Other RAs and How Will RAs Use that Information?
River Corridor Source Units: • 100 and 300 Area component of the River Corridor baseline risk assessment • 100-B/C Pilot Project risk assessment • 100-NR-2 ecological risk assessment	• Estimates of inventory originally disposed, remaining after remediation, and left in place for waste sites. • Planned or completed remedial actions. • Results of any fate and transport calculations performed using fine-grid groundwater model. • Data gathered on media concentrations and observed impacts to sampled species as a calibration/history-matching set for CA tools (ECEM).	• Estimates of groundwater concentration of contaminants emanating from Central Plateau waste sites to figure into River Corridor risk assessments.
River Corridor Groundwater Units: • 300-FF-5, 100-BC-5, 100-FR-3, and 100-KR-4	• Estimates of inventory for originally disposed, remaining after remediation, left in place, and in contaminant plumes. • Planned or completed remedial actions. • Results of any fate and transport calculations performed especially using a refined mesh groundwater model. • Data gathered on media concentrations and observed impacts to sampled species as a calibration/ history-matching set for CA tools (ECEM).	• Estimates of groundwater concentration of contaminants emanating from Central Plateau waste sites to figure into River Corridor risk assessments.
Columbia River Component of the Baseline Risk Assessment	• Data gathered on media concentrations and observed impacts to sampled species as a calibration/history-matching set for CA tools (ECEM). • Data gathered reflecting contamination entering the Hanford Reach of the Columbia River from upstream and from irrigation return flows.	• Estimates of groundwater concentration of contaminants emanating from Central Plateau waste sites to figure into River Corridor risk assessments. • Predicted riparian zone and Columbia River impacts.

CA = composite analysis
CDI = Canyon Disposition Initiative
CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
ECEM = Ecological Chemical Exposure Model
EIS = environmental impact statement
FIR = field investigation report
IDF = Integrated Disposal Facility
ORP = U.S. Department of Energy, Office of River Protection
OU = operable unit
PA = performance assessment
RA = risk assessment
RCRA = *Resource Conservation and Recovery Act of 1976*
RI/FS = remedial investigation/feasibility study
SAC = System Assessment Capability
SST = single-shell tank

7.0 RISK ASSESSMENT INTEGRATION

The DOE (Richland Operations Office and Office of River Protection) has initiated an effort to integrate risk assessments and schedules across the Hanford Site. The CMG has been established and tasked with assembling the common set of information with a reasonable range of parameters and assumptions for risk assessments being conducted or planned across the Hanford Site.

Technical guidance documents are to be prepared by the various projects for risk assessments that are or will be conducted in support of Hanford Site waste cleanup programs. The CMG is responsible for reviewing the parameters and assumptions proposed for each risk assessment (or groups) to ensure that there is cooperation and general consistency among risk assessments at the Hanford Site. In order to begin the process of establishing the common set of information and reasonable range of parameters, technical guidance documents for several projects have been prepared and reviewed by the CMG. These include the *Draft Environmental Impact Statement for the Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, Washington* (DOE 2005), *Composite Analysis for Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site* (PNNL 1998), *Retrieval Performance Evaluation for Single-Shell Tanks S-112 and S-102* (FH 2001), and *Annual Summary of the Integrated Disposal Facility Performance Assessment for 2004* (DOE-ORP 2005).

This initial effort was conducted between the DOE (i.e., the CMG) and a technical working group composed of the contractors responsible for the work. The organizational structure of the CMG and the areas conducting risk assessments across the Hanford Site is shown in Figure 3. The status of risk assessments presented here is based on information obtained from the existing risk assessment integration technical working group with representatives from all of the major projects/programs on the Hanford Site. The CMG and the technical working group formulated an initial risk assessment integration process (illustrated in Figure 4) to improve and guide the development of integrated risk assessments at the Hanford Site.

A workshop was held on April 19, 2005, to discuss Draft A of this document and an initial path forward identified to improve the integration of the risk assessments with a goal of achieving completeness and efficiency in conducting risk assessments to support cleanup and closure of the Hanford Site. The next step to be followed by the CMG will be to work with the regulators, stakeholders, Natural Resource Trustee Council, and Tribes to openly discuss and further develop the common set of information and range of parameters and assumptions for risk assessments. This effort will be conducted as part of the partnering and communication program for further development of the risk integration process.

The initial path forward in this process will involve (1) the CMG and a smaller risk integration technical working group evaluating the risk assessment requirements (i.e., schedules, linkages and gaps) and alignment with closure decision requirements across the site; and (2) a series of workshops with stakeholders, Tribes, and the Natural Resource Trustee Council to obtain their

interests and discuss the integration of site decisions, cumulative analyses, and risk assessment parameters and assumptions.

Figure 3. Hanford Site Risk Assessment Technical Working Group.

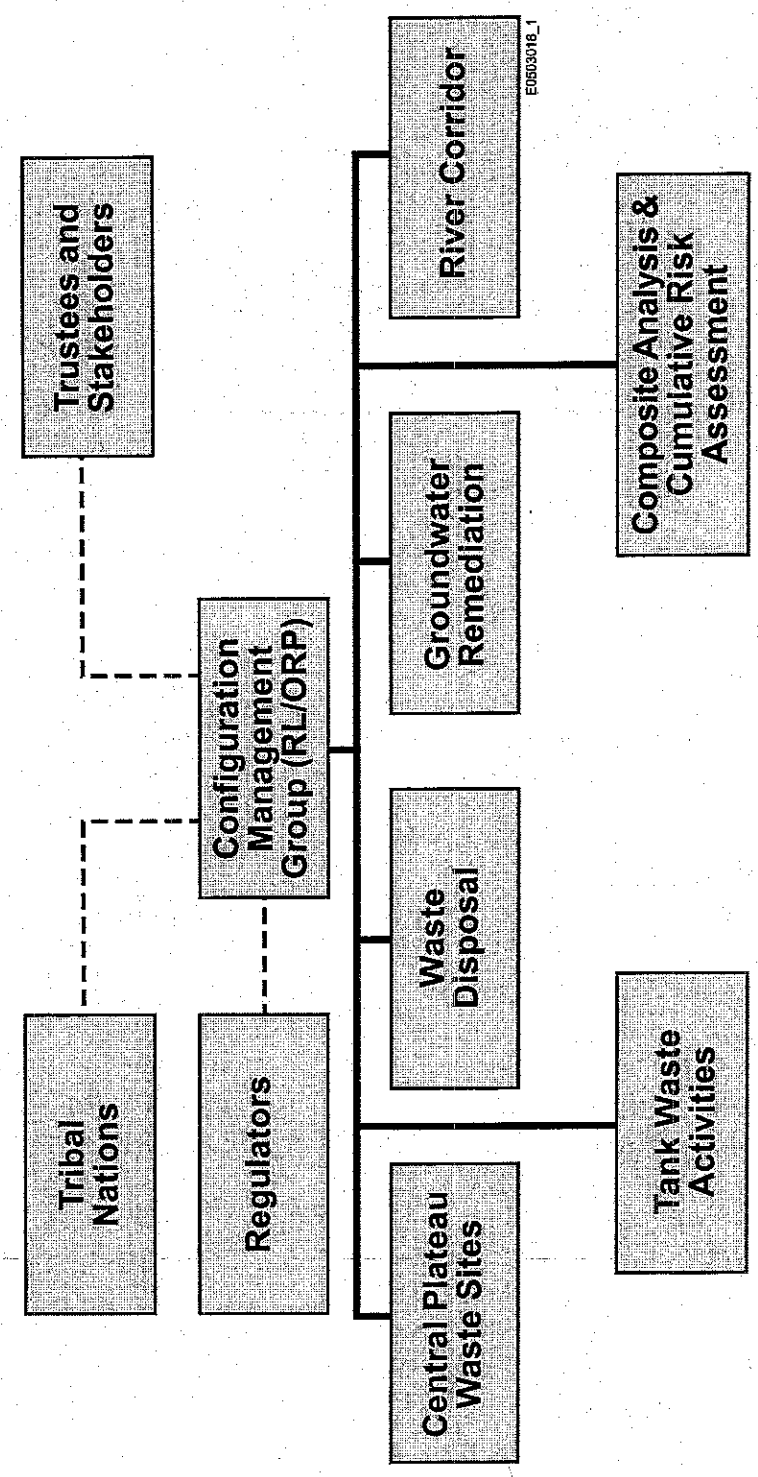
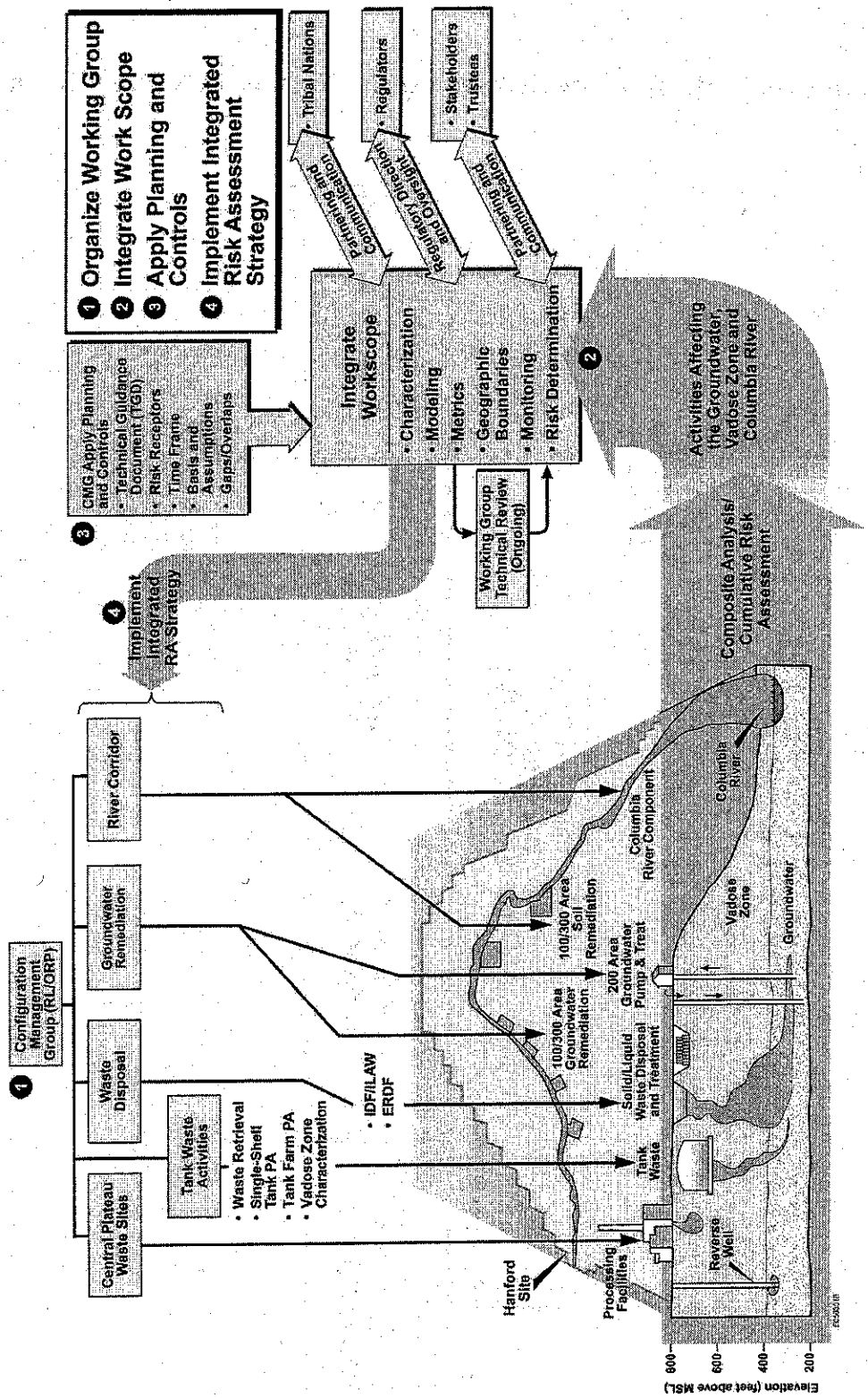


Figure 4. Hanford Site Risk Assessment Integration.



8.0 REFERENCES

10 CFR 1021, "National Environmental Policy Act Implementing Procedures," *Code of Federal Regulations*, as amended.

40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," *Code of Federal Regulations*, as amended.

40 CFR 1508.7, "Cumulative Impact," *Code of Federal Regulations*, as amended.

Atomic Energy Act of 1954, 42 U.S.C. 2011, et seq.

Clean Water Act of 1977, Public Law 95-217, 91 Stat. 1566 and Public Law 96-148, et seq.

Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq.

DOE G 435.1-1, 1999, *Crosswalk Tables DOE Order 5820.2A vs DOE O 435.1/M 435.1-1*, U.S. Department of Energy, Washington, D.C.

DOE M 435.1-1, Change 1, 2001, *Radioactive Waste Management Manual*, U.S. Department of Energy, Washington, D.C.

DOE O 435.1, 1997, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

DOE O 451.1B, Change 1, 2001, *National Environmental Policy Act Compliance Program*, U.S. Department of Energy, Washington, D.C.

DOE, 1994, *Secretarial Policy on the National Environmental Policy Act*, U.S. Department of Energy, Washington, D.C.

DOE, 1999, *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, DOE/EIS-0222-F, U.S. Department of Energy, Washington, D.C.

DOE, 2004, *Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement*, Richland, *Washington*, DOE/EIS-0286F, U.S. Department of Energy, Washington, D.C.

DOE, 2005, *Draft Environmental Impact Statement for the Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site, Richland, Washington*, DOE/EIS-0356, U.S. Department of Energy, Washington, D.C.

DOE and Ecology, 1996, *Tank Waste Remediation System, Hanford Site, Richland, Washington, Final Environmental Impact Statement*, DOE/EIS-0189, U.S. Department of Energy, and Washington State Department of Ecology, Olympia, Washington.

DOE-ORP, 2005, *Annual Summary of the Integrated Disposal Facility Performance Assessment for 2004*, DOE/ORP-2000-19, Rev. 4, U.S. Department of Energy, Office of River Protection, Richland, Washington.

DOE-RL, 1994, *Remedial Investigation and Feasibility Study Report for the Environmental Restoration Disposal Facility (ERDF)*, DOE/RL-93-99, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1999, *Retrieval Performance Evaluation Methodology for the AX Tank Farm*, DOE/RL-98-72, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 2004, *Final Feasibility Study for the Canyon Disposal Initiative (221-U Facility)*, DOE/RL-2001-11, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

EPA, 1988, *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA, Interim Final,* EPA/540/G-89/004, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA, 1989a, *Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual, Interim Final*, EPA/540/1-89/002, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1989b, *Risk Assessment Guidance for Superfund Volume II, Environmental Evaluation Manual*, EPA/540/1-89/001. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1992, *Guidance on Implementation of the Superfund Accelerated Cleanup Model (SACM) Under CERCLA and the NCP*, OSWER Directive 9355.0-30, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2003, *Framework for Cumulative Risk Assessment*, EPA/630/P-02/001F, U.S. Environmental Protection Agency, Washington, D.C.

FH, 2001, *Retrieval Performance Evaluation for Single-Shell Tanks S-112 and S-102,* HNF-7644, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

Hazardous and Solid Waste Amendments of 1984, Public Law 98-616, et seq.

National Environmental Policy Act of 1969, 42 U.S.C. 4321, et seq.

PNNL, 1998, *Composite Analysis for Low-Level Waste Disposal in the 200 Area Plateau of the Hanford Site*, PNNL-11800, Pacific Northwest National Laboratory, Richland, Washington.

RCW 70.105, "Hazardous Waste Management," *Revised Code of Washington*, as amended.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq.

Safe Drinking Water Act of 1974, Public Law 93-523, 88 Stat. 1660 (Title 21), et seq.

Solid Waste Disposal Act of 1965, Public Law 89-272 (Title II), et seq.

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

WAC 173-340, "Model Toxics Control Act," *Washington Administrative Code*, as amended.

WHC, 1995, *Performance Assessment for the Disposal of Low-Level Waste in the 200 West Area Burial Grounds*, WHC-EP-0645, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

RISK ASSESSMENT MATRIX

INDEX TO APPENDIX A

100 and 300 Area Risk Assessments

1. 100-BC-5 Groundwater Operable Unit (OU) – Hanford Site Groundwater Monitoring Project. Focused Feasibility Studies for Five Groundwater OUs.

2. 100-HR-3 Groundwater OU.

3. 100-NR-2 Groundwater OU – Aquatic and Riparian Eco-risk Assessment. Current near-shore aquatic and riparian receptor impacts from contaminated groundwater originating from the 100-N Area as defined in the interim ROD.

3a. 100-NR-2 Groundwater OU – Aquatic and Riparian Eco-risk Assessment. Secondary Eco-risk study addresses hyperheic zone

4. 100-KR-4 Groundwater OU.

5. 100-FR-3 Groundwater OU – Hanford Site Groundwater Monitoring Project. Focused Feasibility Studies Task for Five Groundwater OUs.

6. 300-FF-5 Groundwater OU – Hanford Site Groundwater Monitoring Project. Focused Feasibility Studies Task for Five Groundwater OUs.

7. 100-B/C Pilot Project Risk Assessment. Residual risks to human health and the environment from remediated CERCLA liquid waste sites near the Columbia River edge of the 100-B/C Area of the Hanford Site.

8. 100 Area and 300 Area Component of the Columbia River Baseline Risk Assessment. Residual risks to human health and the environment from remediated CERCLA waste sites in the 100 and 300 Areas of the Hanford Site.

9. Columbia River Component of the Columbia River Baseline Risk Assessment. Potential risks to human health and the environment from Hanford Site-related contaminants released to the Columbia River.

10. Orphan Sites Program.

Hanford Sitewide Assessments

11. Composite Analysis. Site-wide evaluation of the potential long-term human health impacts to a hypothetical future member of the public resulting from combined radionuclide releases to groundwater, surface water, and air from multiple sources during the 1,000-year period following closure of the Hanford Site.

12. Cumulative Analysis of Chemical Impacts. Cumulative impacts of chemical inventories that will remain at Hanford at the time of site closure to complement the Composite Analysis of radionuclide impact.

13a. Hanford Site-Wide Monitoring Program. Sampling, analysis, and reporting of groundwater, vadose zone, seeps, and shoreline.

13b. Hanford Site-Wide Monitoring Program. Ecological risk assessment for lands outside the Central Plateau and the River Corridor baseline risk assessment scope.

13c. Hanford Site-Wide Monitoring Program. Ecological risk assessment for lands west and south of Highway 240.

200 Area Risk Assessments

14. 200-BP-5 Groundwater OU –Hanford Site Groundwater Monitoring Project. Focused Feasibility Studies Task for Five Groundwater OUs.

15. 200-PO-1 Groundwater OU –Hanford Site Groundwater Monitoring Project. Focused Feasibility Studies Task for Five Groundwater OUs.

16. 200-UP-1 Groundwater OU Baseline Risk Assessment Supporting CERCLA remedial investigation/feasibility study (RI/FS) Process. Baseline risk that groundwater contamination will pose to human health if no action were taken.

17. 200-ZP-1 Groundwater OU Baseline Risk Assessment Supporting the CERCLA RI/FS Process. Baseline risk that groundwater contamination will pose to human health if no action were taken.

18. Central Plateau Ecological Risk Assessment.

19a. 200-CW-1. Central Plateau Waste Sites (completed).

19b. 200-TW-1. Central Plateau Waste Sites (completed).

19c. 200-CW-5. Central Plateau Waste Sites (completed).

19d. 200-CS-1. Central Plateau Waste Sites (completed).

19e. 200-PW-2. Central Plateau Waste Sites (completed).

19f. U Plant. Central Plateau Waste Sites (completed).

19g. 100 B/C Cribs. Central Plateau Waste Sites.

19h. 200-LW-1. Central Plateau Waste Sites.

19i. 200-MW-1. Central Plateau Waste Sites.

19j. 200-IS-1. Central Plateau Waste Sites.

19k. 200-UR-1. Central Plateau Waste Sites.

19l. 200-SW-2. Central Plateau Waste Sites.

Tank Waste Activities

20. S-SX field investigation report (FIR) (completed; RPP-7884).

21. B-BX-BY FIR (completed; RPP-10098).

22. T, TX-TY FIR.

23. A-AX/C/U FIR.

24. RFI Rollup.

25. 2001 Immobilized Low-Activity Waste (ILAW) Performance Assessment (completed; DOE/ORP-2000-24 and DOE/EIS-0286). Integrated Disposal Facility (IDF) Performance Assessment.

26. IDF Risk Assessment (complete; RPP-15834). IDF Performance Assessment.

27. Down Selection Risk Assessment (complete; RPP-17675). IDF Performance Assessment.

28. IDF Performance Assessment.

29. Tank Waste Retrieval Work Plans (TWRPs).

30. Preliminary Performance Assessment for WMA C at the Hanford Site, Washington (DOE/ORP-2003-11).

31. Risk Assessments for Closure Plans. Close individual components of tank farm systems.

32. Risk Assessment for Waste Management Area (WMA) S-SX Closure Plan (RPP-21596).

33. Single-Shell Tank Performance Assessment (SST PA).

34. Tank Farm Performance Assessment (TFPA).

35. Retrieval Data Reports. Documents completion of tank-specific (or component-specific) waste retrieval activity.

36. Tank Closure Environmental Impact Statement (EIS).

37. Waste Treatment Plant Operation Assessment

Appendix A – Risk Assessment Matrix

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
100 and 300 Area Risk Assessments														
1	100-BC-5 Groundwater OU – Hanford Site Groundwater Monitoring Project: Focused Feasibility Studies Task for Five Groundwater Operable Units. POC (alt.): Tom Naymik (John Fruchter) DOE: Arlene Tortoso	To obtain a CERCLA ROD in 2009. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is an unacceptable risk, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	100-BC-5 Groundwater OU as it changes over time. Inside the fence of the 100-B/C Area.	The RI/FS focused on the human health from exposure to groundwater. For the 100-BC-5 Area, includes eco-risk for near-shore environment from groundwater and surface water (seeps).	Groundwater. For the 100-BC-5 Area, includes near-shore environment, surface water, seeps, and biota.	Groundwater. For the 100-BC-5 Area, includes near-shore environment, surface water, seeps, and biota.	No vadose zone. No soil.	In accordance with HSBRAM (DOE-RL 1993) and agreement by Tri-Party Agreement unit managers, four exposure scenarios are evaluated – industrial, residential, recreational, and agricultural. No Tribal scenarios were evaluated.	Human health has a complicated uncertainty analysis approach. Eco conceptual model shows two eco systems affected: riparian/terrestrial and aquatic.	The assessment end point is the health of selected receptor organisms and their populations.	• Baseline risk assessment was done about 10 years ago; updates are needed. • Composite Analysis • Hanford Site-Wide Monitoring Program • 100-B/C Pilot risk assessment	• History matching for Composite Analysis • River Component risk assessment • Cumulative risk assessment • Output link: 100 and 300 Area risk assessment	• Current conditions • Future impacts out to 1,000 years • Timeframe link: 1,000 years, then Composite Analysis thereafter	• Input link from 100-B/C Pilot risk assessment • Output link to 100/300 Area risk assessment • Output link to the river component risk assessment • Input link from 200 East groundwater • Input link from 200 West groundwater • Output into cumulative risk assessment
2	100-HR-3 Groundwater OU. POC (alt.): Jane Borghese DOE: Arlene Tortoso	To obtain a CERCLA ROD in 2012 . 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is an unacceptable risk, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	100-HR-3 OU including shoreline.	Human health and ecological impacts from groundwater and seeps.	Groundwater, seeps, and shorelines.	Groundwater. Shoreline and river aquatic receptors.	Excludes vadose zone.	TBD	Ambient water quality standards, MCLs, and existing RAOs. Plume size and concentrations and source terms to groundwater.	Shoreline and river aquatic receptors.	• Hanford Site-Wide Monitoring Program • 100 and 300 Area DQO and risk assessment • Columbia River risk assessment	• History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years • Timeframe link: risk assessment up to 1,000 years, then Composite Analysis thereafter	• Output into cumulative risk assessment • Input link: 100 and 300 Area risk assessment

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
3	100-NR-2 Groundwater OU – Aquatic and Riparian Eco-risk Assessment: Current near-shore aquatic and riparian receptor impacts from contaminated groundwater originating from the 100-N Area as defined in the interim ROD (as amended, April 2004). POC (alt.): Vern Johnson (?) DOE: Mike Thompson	To obtain CERCLA ROD in 2014. The risk assessment for the FS and proposed plan is currently scheduled to begin in 2008. Purpose of the current eco-risk: 1. Is the current pump-and-treat system adequate to protect eco receptors or should alternative remedial actions be considered?	The length of shoreline impacted by 100-NR-2 groundwater contaminant plumes (diesel, strontium-90, and metals) defines the spatial boundaries of the study.	Initial eco-risk study is divided into two ecological zones for study and sampling purposes: riparian and near-shore.	Aquatic and riparian biota (e.g., vegetation, invertebrates, fish, birds, small mammals), soil, sediment, and water along the shoreline and within the near-shore river environment will be sampled.	The length of Columbia River shoreline matching the extent of groundwater plumes originating from 100-N, and a width defined by a river depth of approximately 1.8 m (6 ft) and the steep bank along the 100-N shoreline. Thus, the study zone is limited to a width of not more than 100 m from the shoreline.	No upland areas and no human health impacts for the deliverable in October 2005 (specified in the interim ROD, as amended in 2004). However, sampling consistent with human health assessment will be accommodated to the extent possible.	Not included.	Rad: Exposures to biotic receptors calculated using RESRAD-BIOTA methodology (ISCORS 2004); WAC 173-201A-260, and comparison with Table II in WAC 246-221-290. Non-rad: WAC 173-340-900, Table 749-3 screening values; WAC 173-340-7490 terrestrial ecological evaluation procedures including wildlife exposure model; and comparisons with reference sites. Comparisons with other relevant WAC water and sediment quality criteria and standards (e.g., Table 240(3) in WAC 173-201A). Current groundwater contaminant concentrations from the Hanford Site Groundwater Monitoring Project, ongoing laboratory uptake study results, operational data (e.g., NPDES effluent monitoring data, crib waste records), computer modeling and associated risk assessor capabilities.	Aquatic and terrestrial biota, including periphytons, clams, sculpin, and resident riparian vegetation.	• Hanford Site-Wide Monitoring Program • 100 and 300 Area DQO	• History matching for Composite Analysis • Cumulative risk assessment • 100 and 300 Area risk assessment • 100-NR-2 remedial investigation	• Current conditions	• Output into cumulative risk assessment
a				Secondary eco-risk study addresses hyperheic zone.	Near shore river substrate.				Substrate grain size distribution, hyporheic invert counting.	Determination of hyporheic invert presence/ populations.	None.	• Cumulative risk assessment • 100 and 300 Area risk assessment • 100-NR-2 remedial investigation	• Current conditions	• Output into cumulative risk assessment

Appendix A – Risk Assessment Matrix

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
4	100-KR-4 Groundwater OU. POC (alt.): Jane Borghese DOE: Arlene Tortoso	To obtain a CERCLA ROD in 2014. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is an unacceptable risk, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	100-KR-4 OU including shoreline.	Human health and ecological impacts from groundwater and seeps.	Groundwater, seeps, and shorelines.	Groundwater. Shoreline and river aquatic receptors.	Excludes vadose zone.	TBD	Ambient water quality standards, MCLs, and existing RAOs. Plume size and concentrations and source terms to groundwater.	Shoreline and river aquatic receptors.	• Hanford Site-Wide Monitoring Program • 100 and 300 Area DQO and risk assessment • River Component risk assessment	• History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years • Timeframe link: 1,000 years then Composite Analysis thereafter	• Output into cumulative risk assessment • Input link: 100 and 300 Area risk assessment • Input link: River Component risk assessment
5	100-FR-3 Groundwater OU – Hanford Site Groundwater Monitoring Project: Focused Feasibility Studies Task for Five Groundwater Operable Units. POC (alt.): Tom Naymik (John Fruchter) DOE: Arlene Tortoso	To obtain a CERCLA ROD in 2009. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is an unacceptable risk, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	100-FR-3 Groundwater OU as it changes over time. Just inside the fence of the 100-F Area.	The RI/FS focused on the human health from exposure to groundwater. For 100-FR-3, includes eco-risk for near-shore environment from groundwater and surface water (seeps).	Groundwater For 100-FR-3 Area, includes near-shore environment, surface water, seeps, and biota.	Groundwater. For 100-FR-3 Area, includes near-shore environment, surface water, seeps, and biota.	No vadose zone. No soil.	In accordance with HSBRAM (DOE-RL 1993) and agreement by Tri-Party Agreement unit managers, four exposure scenarios are evaluated: industrial, residential, recreational, and agricultural. No Tribal scenarios were evaluated.	Human health has a complicated uncertainty analysis approach. Eco conceptual model shows two eco systems affected: riparian/terrestrial and aquatic.	The assessment end point is the health of selected receptor organisms and their populations.	• Baseline risk assessment has been done about 10 years ago; updates are needed • Composite Analysis • Hanford Site-Wide Monitoring Program • 100 and 300 Area risk assessment	• History matching for Composite Analysis • River Component risk assessment • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years • Timeframe link: 1,000 years then Composite Analysis thereafter	• Input link from 100 and 300 Area risk assessment • Output link to the River Component risk assessment • Input from 200 East groundwater • Input from 200 West Groundwater • Output into cumulative risk assessment

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
6	300-FF-5 Groundwater OU – Hanford Site Groundwater Monitoring Project: Focused Feasibility Studies Task for Five Groundwater Operable Units. POC (alt.): Tom Naymik (John Fruchter) DOE: Mike Thompson	To evaluate the progress of the existing ROD approach (monitored natural attenuation). To obtain a final ROD in 2007. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is an unacceptable risk, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	300-FF-5: 300 Area uranium plume (including other contaminants of concern in the same area) as it changes over time, including the 618-10 and 618-11 Burial Grounds and the 316-4, 600-63, and 600-259 source waste sites.	Update the existing RI/FS focused on the human health from exposure to groundwater, includes eco-risk for near-shore environment from groundwater and surface water (seeps).	Groundwater. Near-shore environment, surface water, seeps, and biota.	Groundwater. For 300-FF-5 Area, includes near-shore environment, surface water, seeps, and biota.	No vadose zone. No soil (under negotiations).	In accordance with HSBRAM (DOE-RL 1993) and agreement by TPA unit managers, four exposure scenarios are evaluated: industrial, residential, recreational, and agricultural. No Tribal scenarios were evaluated. Human health has a complicated uncertainty analysis approach.	Eco conceptual model shows two eco systems affected: riparian/terrestrial and aquatic.	300-FF-5: The assessment end point is the health of selected receptor organisms and their populations.	• Baseline risk assessment was done about 10 years ago; updates are needed • The update for the 300-FF-5 baseline risk assessment, if required, will not require additional sampling • 618-10 and 618-11 Burial Grounds; 316-4, 600-63, and 600-259 source waste sites • Composite Analysis • Hanford Site-Wide Monitoring Program • 100 and 300 Area risk assessment	• History matching for Composite Analysis • River Component risk assessment • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years • Timeframe link: 1,000 years, then Composite Analysis thereafter	• Input link: 100 and 300 Area risk assessment • Output link to the River Component risk assessment • Input link from 200 East groundwater • Input link from 200 West groundwater • Output link into cumulative risk assessment
7	100-B/C Pilot Project Risk Assessment: This project addresses residual risks to human health and the environment from remediated CERCLA liquid waste sites near the Columbia River edge of the 100-B/C Area of the Hanford Site. It evaluates protectiveness of interim remedial actions and establishes concentrations of COPCs in media that are protective of human and ecological receptors. POC (alt.): Ken Gano (Jenifer Linville) DOE: John Sands	To obtain a CERCLA ROD in 2008. 1. Are current remedial actions adequate for protection of human and eco receptors?	The geographic boundaries for this component are limited to remediated liquid waste sites in the upland areas of the 100-B/C Area, the riparian zone, and the near-shore environment extending into the Columbia River to a depth of 1.8 m (6 ft). There is also an upriver reference area (above Vernita Bridge) and a downstream sample location (between the 100-B/C and 100-K Areas) from which comparative soil and biota samples have been collected.	The resolution of study is divided into three ecological zones for study and sampling purposes: upland, riparian, and near-shore. Risks resulting from human and ecological exposures are being evaluated across all three defined zones within the 100-B/C Area. Groundwater use within the geographical scope that is consistent with identified exposure scenarios is also being evaluated.	Biota (e.g., vegetation, invertebrates, vertebrates, birds), soil, sediment, and emergent groundwater at Columbia River springs along the 100-B/C shoreline and within the near-shore river environment.	Upland, riparian, and near-shore river environments of the 100-B/C Area, and associated Columbia River shorelines along this area to a depth of approximately 1.8 m (6 ft).	Columbia River depths greater than 1.8 m (6 ft), upland areas beyond remediated liquid waste sites within the 100-B/C Area, and use of groundwater in areas outside of the geographical scope of this study.	Rural resident, Hanford Reach National Monument personnel, avid recreationalist, and Tribal subsistence (specific to each Tribe).	Human Health: RESRAD Version 6.2 (ANL 2001); EPA 1989, 1991, 1994a, 1994b, 1996, 1997c, 2001c, 2002a, 2002b, 2004; WAC 173-340. Ecological: EPA 1992a, 1997a, 1997b, 1998; WAC 173-340-7490; 40 USC 300 et seq.; 33 USC 1251 et seq., 42 USC 7401 et seq.; WAC 173-340 et seq.; 40 CFR 141; *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE 2002); *Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards* (IAEA 1992).	Aquatic and terrestrial biota.	• Hanford Site-Wide Monitoring Program • 200-BP-5 Groundwater	• History matching for Composite Analysis • Cumulative risk assessment • Used as the basis to develop the River Component risk assessment • Used as the basis for the 100/300 Area risk assessment • 100-BC-5 groundwater	• Current conditions	• Output into cumulative risk assessment • Output link to 100-BC-5 Groundwater OU • Input link from 200-BP-5 groundwater

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
8	100 Area and 300 Area Component of the Columbia River Baseline Risk Assessment: This project addresses residual risks to human health and the environment from remediated CERCLA waste sites in the 100 and 300 Areas of the Hanford Site. It evaluates protectiveness of interim remedial actions and establishes concentrations of COPCs in media that are protective of human and ecological receptors. POC (alt): Steve Weiss (Jenifer Linville) DOE: John Sands	To obtain a CERCLA ROD in 2008 (proposed date). 1. Are current remedial actions adequate for protection of human and eco receptors?	Geographical scope includes the 100 Area reactor areas, the White Bluffs Townsite (100-IU-2), the Hanford Townsite (100-IU-6), and the 300 Area. The Columbia River along the reactor areas to a depth of approximately 1.8 m (6 ft) and matching the known groundwater contaminant plumes where they reach the river (excluding plumes that are exclusively of 200 Areas origin) and groundwater use within the 100 and 300 Areas that is consistent with identified exposure scenarios.	The resolution of study is divided into three ecological zones for study and sampling purposes: upland, riparian, and near-shore. Risks resulting from human and ecological uses will be evaluated across all three zones on a reactor-area basis.	Biota (e.g., vegetation, invertebrates, vertebrates, and birds), soil, sediment, and emergent groundwater at Columbia River springs along the shoreline and within the near-shore river environment are being evaluated.	Upland, riparian, and near-shore river environments of the 100 and 300 Areas, White Bluffs Townsite (100-IU-2), Hanford Townsite (100-IU-6), and associated Columbia River shorelines along these areas and matching the extent of groundwater plumes where they reach the river to a depth of approximately 1.8 m (6 ft).	Columbia River depths greater than 1.8 m (6 ft), river shoreline areas away from where known contaminant plumes reach the river, north bank of the river, use of groundwater in areas outside of the geographical scope of this study.	Rural resident, Hanford Reach National Monument personnel, avid recreationalist, Tribal subsistence (Tribal-specific scenarios as provided), industrial worker (for 300 Area).	Human Health: RESRAD Version 6.2 (ANL 2001); EPA 1989, 1991, 1994a, 1994b; 1996, 1997c, 2001c, 2002a, 2002b, 2004; WAC 173-340. Ecological: EPA 1992a, 1997a, 1997b, 1998; WAC 173-340-7490; 40 USC 300 et seq.; 33 USC 1251 et seq., 42 USC 7401 et seq.; WAC 173-340 et seq.; 40 CFR 141; *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE 2002); *Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards* (IAEA 1992).	Aquatic and terrestrial biota (specific biota TBD in DQO/SAP).	• Hanford Site-Wide Monitoring Program • 100-B/C Pilot risk assessment • 100-NR-2 eco-risk • Collection of soil and biota data	• History matching for Composite Analysis • Cumulative risk assessment • River Component risk assessment • 300-FF-5 Groundwater • 100 Area groundwater	• Current conditions	• Output into cumulative risk assessment • Output link to 100 Area groundwater • Output link to 300-FF-5 groundwater

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
9	Columbia River Component of the Columbia River Baseline Risk Assessment: This project addresses potential risks to human health and the environment from Hanford Site-related contaminants released to the Columbia River. It will identify concentrations of COPCs and evaluate these against established standards of protectiveness. POC (alt.): Tom Marceau (Donna Morgans) DOE: John Sands	What is the baseline risk of impacts to the Columbia River?	Evaluate and summarize existing data from the upstream jurisdictional boundary of the Hanford Site (west of Vernita Bridge) downstream to Astoria, Oregon, near the mouth of the Columbia River. The downstream boundary of the characterization area will be set at the farthest point at which Hanford Site contaminants exceed regulatory standards (e.g., ambient water quality criteria) and other benchmarks (e.g., sediment screening values).	Data from locations above the Hanford Site boundary (e.g., sediments behind the Priest Rapids Dam) as well as other potential sources to the Columbia (e.g., lower portions of the Yakima and Snake Rivers) will be evaluated to determine reference conditions. The width of the study area will be determined by the terrace system defining the geological history and flow of the Columbia River and will extend along both banks of the Columbia River. It will include the near-shore and riparian zones not included within the 100 Area and 300 Area Component, and shore-attached and mid-channel islands. Hanford Site contaminant concentrations and associated risks from media at points where contaminants are most likely to be present, including groundwater interfaces within the river, sediments in slower-moving portions of the river channel (e.g., sloughs, island point bars), and the McNary Dam reservoir pool.	Biota (e.g., vegetation, invertebrates, vertebrates), soil and sediment from both the shoreline and riverbed, and river water and emergent groundwater at springs along the shoreline and within the river.	Hanford Site contaminant data will be reviewed and evaluated to identify the potential for exposure that may affect human health and the environment as defined by CERCLA. Efforts will be made to identify contaminant sources through use of appropriate analytical methods for fingerprinting or identifying isotope markers. A baseline/ background of water quality and sediment contaminant levels will be established above the upstream boundary of the study area at known point source locations of irrigation returns on the Hanford Site and at the junctions of the Yakima and Snake Rivers with the Columbia. Only risks corresponding to Hanford Site contaminants will be evaluated.	Removal/ treatment of river pipelines extending from the reactor areas into the Columbia River (100 Area and 300 Area Component scope), non-Hanford facilities (e.g., Energy Northwest, Vernita rest area, public boat ramps), non-Hanford developed areas that may be immediately adjacent to or on the H-3 river terrace (e.g., portions of the City of Richland), all NPDES-permitted facilities (except that some applicable discharge data may be reviewed), cumulative effects from non-Hanford Site sources (e.g., offsite mining, pulp mill, and agricultural impacts), White Bluff landslide assessments, land transfers, Natural Resource Damage Assessments, and physical hazards/trash.	Rural resident, Native American subsistence (specific to each Tribe), recreational users (e.g., hunters, fishers), Hanford Reach National Monument personnel, research scientists, and workers (e.g., agricultural, fish hatchery, tour boat drivers, dredge operators).	Human Health: RESRAD Version 6.2 (ANL 2001); EPA 1989, 1991, 1994a, 1994b, 1996, 1997c, 2001c, 2002a, 2002b, 2004; WAC 173-340. Ecological: EPA 1992a, 1997a, 1997b, 1998; WAC 173-340-7490; 40 USC 300 et seq.; 33 USC 1251 et seq.; 42 USC 7401 et seq.; WAC 173-340 et seq.; 40 CFR 141; *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota* (DOE 2002); *Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards* (IAEA 1992).	TDB in DQO.	• Composite Analysis • Hanford Site-Wide Monitoring Program • 100-B/C Pilot risk assessment • 100 and 300 Area risk assessment	• History matching for Composite Analysis • Cumulative risk assessment	• Current conditions	• Input links from 200 Area groundwater • Input links from 100 and 300 Area groundwater • Output links into cumulative risk assessment

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
10	Orphan Sites Project. POC (alt.): Linda Dietz (Mike Schwaub) DOE: Jamie Zeisloft	Are all waste sites identified and addressed after remedial actions? Provides essential data to fill in gaps between the risk assessment study boundaries.	100, 300, and 600 Areas (100-IU-2 and 100-IU-6)	The first area to be evaluated and completed (in FY 2004) was the 100-B/C Area. The evaluation process included a historical document review (reports, photographs, drawings) and a field walkdown in 900-m^2 increments. New sites are entered into the WIDS database for further evaluation and disposition.	• Surface soils • Man-made features • "Anomalies" such as disturbed soil or distressed vegetation • GPR is completed for selected sites	Historical document reviews and field walkdowns.	No digging or intrusive sampling. If anomaly is identified, it is entered into WIDS for further evaluation and disposition.	Excluded.	None.	None.	None.	• All risk assessments	• Current conditions	None.

Appendix A – Risk Assessment Matrix

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
Hanford Site-Wide Assessments														
11	Composite Analysis: The Composite Analysis is a site-wide evaluation of the potential long-term human health impacts to a hypothetical future member of the public resulting from combined radionuclide releases to groundwater, surface water, and air from multiple sources during the 1,000-year period following closure of the Hanford Site. A Composite Analysis is required under DOE M 435.1-1 for active and planned low-level radioactive waste disposal facilities to ensure public safety from the management of these facilities. A Composite Analysis is defined as "a reasonably conservative assessment of the cumulative impacts from active and planned LLW disposal facilities, and all other sources from radioactive contamination that could interact with the LLW disposal facility to affect the dose to future members of the public." POC (alt.): Bob Bryce (Charlie Kincaid) DOE: Doug Hildebrand	Can low-level radioactive waste continue to be disposed of at Hanford? Fundamental question that supports all cleanup decisions.	The Hanford Site from Rattlesnake Mountain to the Columbia River, and the Columbia River from Vernita Bridge to the confluence of the Yakima River.	Each of approximately 1,000 waste sites are represented individually in the cumulative assessment. The model used will simulate Hanford waste disposal and contaminant transport from 1944 to 10,000 years after site closure. The risk assessment will examine the impact of all waste sites from the Central Plateau boundary to the margins of the study area. Risks resulting from human uses of the air, water, land surface, and ecological resources will be evaluated.	Biota (e.g., vegetation, invertebrates, vertebrates, birds), soil, sediment, groundwater, springs, seeps, shoreline, near-shore river water, surface water, and air.	The Hanford Site from Rattlesnake Mountain to the Columbia River, and the Columbia River from Vernita Bridge to the City of Richland.	Hazardous chemicals and ecological impacts.	Rural farmer, Hanford Reach National Monument personnel, avid recreationalist, casual recreationalist, and Tribal subsistence (Harper and Harris and Harris).	Human Health: HUMAN code.	None.	• Hanford Site-Wide Monitoring Program • 200 West groundwater • 200 East groundwater • River Component risk assessment • 100 and 300 Area risk assessment • 100-B/C Pilot risk assessment • 100-NR-2 eco-risk • WIDS • HEIS • Tank waste inventory information from ORP including HTWOS and secondary waste stream split factors • Inventory estimates for liquid waste streams from Soil Inventory Model • Solid waste inventories from Waste Management Program • IDF Performance Assessment • SST Performance Assessment • Tank Farms Performance Assessment	• 200 West groundwater • 200 East groundwater • River Component risk assessment • 100 and 300 Area risk assessment • IDF Performance Assessment • SST Performance Assessment • Tank Farms Performance Assessment • 100-B/C Pilot risk assessment	• Past conditions from 1944 • Current conditions • Future impacts 10,000 years after site closure • 1,000-year regulatory period	• Input links from River Component risk assessment • Input links from 100 and 300 Area risk assessment

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
12	Cumulative Analysis of Chemical Impacts: This is an assessment of the cumulative impacts of chemical inventories that will remain at Hanford at the time of site closure to complement the Composite Analysis of radionuclide impact. This analysis will also estimate ecological impact from the radionuclide distribution predicted by the Composite Analysis so that the combination of this analysis and the Composite Analysis will provide a look at human and ecological impacts of radionuclides and hazardous chemicals left at Hanford at the time of site closure. POC (alt.): Bob Bryce (Charlie Kincaid) DOE: Doug Hildebrand	What is the cumulative impact on the environment and human health of hazardous chemicals that will remain at the site? Fundamental question that supports all cleanup decisions.	The Hanford Site from Rattlesnake Mountain to the Columbia River, and the Columbia River from Vernita Bridge to the confluence of the Yakima River.	Each of approximately 1,000 waste sites are represented individually in the assessment. The model used will simulate Hanford waste disposal and contaminant transport from 1944 to 10,000 years after site closure. Risk assessment will examine impact of all waste sites from the Central Plateau boundary to the margins of the study area. Risks resulting from human and ecological uses of the air, water, land surface, and ecological resources will be evaluated.	Biota (e.g., vegetation, invertebrates, vertebrates, birds), soil, sediment, groundwater, springs, seeps, shoreline, near-shore river water, surface water, and air.	The Hanford Site from Rattlesnake Mountain to the Columbia River, and the Columbia River from Vernita Bridge to the City of Richland.	None.	Rural farmer, Hanford Reach National Monument personnel, avid recreationalist, casual recreationalist, Tribal subsistence (Harper and Harris, and Harris).	Human Health: HUMAN code. Ecological Impacts: ECEM code calculates dose for radionuclides and impacts for chemicals; food-web based architecture allows evaluation to site-specific species as well as for endpoints used for human consumption in the HUMAN code. ECEM evaluation of radiological dose equivalent to Tier 3 evaluation in RESRAD Biota. ECEM code history matched to Hanford/Columbia River data sets (WAC 173-340; Becker et al. 1998; Brandt et al. 2004; Bryce et al. 2002; DOE 1995, 1998, 2002, 2004; Eslinger et al. 2004; EPA 1998, 2001a, 2001b; ISCORS 2004; Patton et al. 2003; Soldat et al. 1974; Van Verst et al. 1998).	WAC 173-340; Becker et al. 1998; DOE 1995, 1998; EPA 1998	• Hanford Site-Wide Monitoring Program • 200 West groundwater • 200 East groundwater • River Component risk assessment • 100 and 300 Area risk assessment • 100-B/C Pilot risk assessment • 100-NR-2 eco-risk • WIDS • HEIS • Tank waste inventory information from ORP including HTWOS and secondary waste stream split factors • Inventory estimates for liquid waste streams from Soil Inventory Model • Solid waste inventories from Waste Management Program • IDF Performance Assessment • SST Performance Assessment • Tank Farms Performance Assessment	• Regulatory decisions	• Past conditions from 1944 • Current conditions • Future impacts 10,000 years after site closure • 1,000-year regulatory period	• Input links from all other risk assessments
13a	Hanford Site-Wide Monitoring Program: Sampling, analysis, and reporting of groundwater, vadose zone, seeps, and shoreline. POC (alt.): PNNL DOE: Dana Ward	Provides data for risk assessments, studies, and decisions. Monitors for unknown or unaccounted impacts on the environment and human health at the site. Provides essential data to fill in gaps between the risk assessment study boundaries.	Entire Hanford Site.	Ambient water quality standards, MCLs, and existing RAOs.	Groundwater. Shoreline and river aquatic receptors.	Plume size and concentrations and source terms to groundwater.	Remedial actions to support final groundwater RODs.	None.	Ambient water quality standards, MCLs, and existing RAOs.		None. Orphan sites discovery process.	All risk assessments.	• Historical • Current conditions	

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
13b	Hanford Site-Wide Monitoring Program: Ecological risk assessment for lands outside the Central Plateau and the River Corridor baseline risk assessment scope. POC (alt.): PNNL DOE: Dana Ward	Do the risks to eco receptors in the habitat outside the core zone and River Corridor require remedial actions? Provides essential data to fill in gaps between the risk assessment study boundaries.	Land north of Highway 240 outside of the Central Plateau and the River Corridor.	These studies would focus on areas outside of known waste sites. This would include eco impacts from orphan sites and airborne deposition outside the core zone and River Corridor baseline risk assessments.	Surface soils and terrestrial biota.	Terrestrial ecological receptors.	Human health and groundwater.	Excluded.	Rad: Exposures to biotic receptors calculated using RESRAD-BIOTA methodology (ISCORS 2004), WAC 173-201A-260, and comparison with Table II in WAC 246-221-290. Non-rad: WAC 173-340-900, Table 749-3 screening values; WAC 173-340-7490 terrestrial ecological evaluation procedures including wildlife exposure model; and comparisons with reference sites.	Terrestrial biota including vegetation, inverts, and mice.	None. Orphan sites discovery process.	All risk assessments.	• Historical • Current conditions	
13c	Hanford Site-Wide Monitoring Program: Ecological risk assessment for lands west and south of Highway 240. POC (alt.): PNNL DOE: Dana Ward	Do the risks to eco receptors in the habitat outside the core zone and River Corridor require remedial actions? Provides essential data to fill in gaps between the risk assessment study boundaries.	Lands west and south of Highway 240.	These studies would focus on areas outside of known waste sites. This would include eco impacts from orphan sites and airborne deposition outside the core zone and River Corridor baseline risk assessments.	Surface soils and terrestrial biota.	Terrestrial ecological receptors.	Human health and groundwater.	Excluded.	Rad: Exposures to biotic receptors calculated using RESRAD-BIOTA methodology (ISCORS 2004), WAC 173-201A-260, and comparison with Table II in WAC 246-221-290. Non-rad: WAC 173-340-900, Table 749-3 screening values; WAC 173-340-7490 terrestrial ecological evaluation procedures including wildlife exposure model; and comparisons with reference sites.	Terrestrial biota including vegetation, inverts, and mice.	None. Orphan sites discovery process.	All risk assessments.	• Historical • Current conditions	
	200 Area Risk Assessments													
14	200-BP-5 Groundwater OU – Hanford Site Groundwater Monitoring Project: Focused Feasibility Studies Task for Five Groundwater Operable Units. POC (alt.): Tom Naymik (John Fruchter) DOE: Arlene Tortoso	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is unacceptable risks, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	200-BP-5 groundwater OU as it changes over time. 200-BP-5 OU and north through the Gable Gap to the Columbia River.	The RI/FS focused on the human health from exposure to groundwater. For the 200-BP-5 Area, includes eco-risk for near-shore environment from groundwater and surface water (seeps).	Groundwater. For the 200-BP-5 Area, includes near-shore environment, surface water, seeps, and biota.	Groundwater. For 200-BP-5 Area, includes near-shore environment, surface water, seeps, and biota.	No vadose zone. No soil.	In accordance with HSBRAM (DOE-RL 1993) and an agreement by Tri-Party Agreement unit managers, four exposure scenarios are evaluated: industrial, residential, recreational, and agricultural. No Tribal scenarios were evaluated.	Human health has a complicated uncertainty analysis approach. Eco conceptual model shows two eco systems affected: riparian/terrestrial and aquatic.	The assessment end point is the health of selected receptor organisms and their populations.	• Baseline risk assessment has been done about 10 years ago; updates are needed • Composite Analysis • Hanford Site-Wide Monitoring Program	• History matching for Composite Analysis • River Component risk assessment • Cumulative risk assessment • 100 and 300 Area risk assessment • 200 West groundwater	• This ground-water OU may dry out • Current conditions • Future impacts out to 1,000 years • Timeframe link: 1,000 years, then Composite Analysis thereafter • Timeframe link to 100 and 300 Area risk assessment River Component risk assessment (current conditions vs. future plume emergence into river)	• Output link: 100 and 300 Area risk assessment • Output link to the River Component risk assessment • Output link from 200 West groundwater • Output into cumulative risk assessment

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
15	200-PO-1 Groundwater OU – Hanford Site Groundwater Monitoring Project: Focused Feasibility Studies Task for Five Groundwater Operable Units. POC (alt.): Tom Naymik (John Fruchter) DOE: Arlene Tortoso	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is unacceptable risks, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	200-PO-1 groundwater OU as it changes over time. 200-PO-1 OU and all areas to the east between it and the Columbia River.	The RI/FS focused on the Human health from exposure to groundwater. For the 200-PO-1 Area, includes eco-risk for near-shore environment from groundwater and surface water (seeps).	Groundwater. For the 200-PO-1 Area, includes near-shore environment, surface water, seeps, and biota.	Groundwater. For the 200-PO-1 Area, includes near-shore environment, surface water, seeps, and biota.	No vadose zone. No soil.	In accordance with HSBRAM (DOE-RL 1993) and an agreement by Tri-Party Agreement unit managers, four exposure scenarios are evaluated: industrial, residential, recreational, and agricultural No Tribal scenarios were evaluated.	Human health has a complicated uncertainty analysis approach. Eco conceptual model shows two eco systems affected: riparian/terrestrial and aquatic.	The assessment end point is the health of selected receptor organisms and their populations.	• Baseline risk assessment was done about 10 years ago; updates are needed • Composite Analysis • Hanford Site-Wide Monitoring Program • 200 West groundwater	• History matching for Composite Analysis • River Component risk assessment • Cumulative risk assessment • 100 and 300 Area risk assessment • 200-PO-1 groundwater • 100 B/C cribs	• Current conditions • Future impacts out to 1,000 years • Timeframe link: 1,000 years, then Composite Analysis thereafter • Timeframe link to 100 and 300 Area risk assessment • River Component risk assessment (current conditions vs. future plume emergence into river)	• Output link: 100 and 300 Area risk assessment • Output link to the River Component risk assessment • Output link from 200 West groundwater • Output into cumulative risk assessment • Input link from 200-TW-1 and 200-TW-2
16	200-UP-1 Groundwater OU Baseline Risk Assessment Supporting CERCLA RI/FS Process: This project will be assessing the baseline risk that groundwater contamination will pose to human health if no action were taken. This baseline risk assessment will take into consideration the contamination that is currently in the groundwater as well as the contamination that vadose zone models predict will eventually reach the groundwater (includes CERCLA source units and tank farms as sources of contamination). POC: Mark Byrnes DOE: Arlene Tortoso	To obtain a CERCLA ROD in 2009. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is an unacceptable risk, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	200-UP-1, including the 200 West Area. However, the model will predict the movement of contamination to the boundaries of the core zone, boundaries of the Central Plateau, as well as to the Columbia River. The scope predominantly addresses movement and changes in the plume over time in the upper unconfined aquifer.	These studies will evaluate human health impacts from use of groundwater between the down gradient of the OU boundary in vicinity of the 200 West Area to the Columbia River.	These studies will evaluate human health impacts resulting from use of groundwater. Could also require an ecological impacts (under negotiation).	This study will predict baseline risks associated with SAC modeled groundwater contamination at one worst-case location (e.g., PFP), core zone boundary, and Central Plateau boundary, as well as to the Columbia River. The scope predominantly addresses movement in the upper unconfined aquifer.	No ecological receptors impacted by groundwater contamination prior to it reaching the Columbia River. However, if groundwater contamination does reach the Columbia River, what is the impact? Not certain if ecological risk assessment is required (currently under negotiation).	Exposure scenarios as defined in HSRAM (DOE-RL 1996) scenarios. For risk estimated within the core zone, will consider the industrial and recreational scenarios. Outside of the core zone, evaluate agricultural and residential scenarios. Scenarios are further described in the September 1999 Letter Report (BHI 1999). Other references for the scenarios include the Hanford Site Risk Assessment Methodology (DOE-RL 1995) and CRCIA, Part II (DOE-RL 1998a). All scenarios referred to above are part and have been parameterized for the majority of the COCs (i.e., Tc-99, U, I-129, H3, CCL4, Cr, and nitrate) within the current SAC risk framework. However, some specific risk data/ information will need to developed for others such as TCE and others that may need to be evaluated.	Human heath impacts will be based on risk assessment methods embodied in the SAC. The SAC makes use of the Human Health Risk Assessment Module (Human Code Version 3.0 [Eslinger 2004]) to estimate cancer and noncancer risks to humans from contaminants in the study region. Water Quality Standards/Metrics: 40 CFR 141. Depth-discrete groundwater sample results to define three-dimensional distribution of COCs, K_d analyses on key COCs, aquifer testing (e.g., slug testing) to define aquifer hydraulic characteristics, other hydraulic and transport inputs (e.g., effective porosity, bulk density, total porosity), particle size distribution data, STOMP and CFEST modeling results using SAC.	Eco risk is under negotiations. Future potential link to the Columbia River risk assessment.	• Composite Analysis (risk assessment and modeling is a subset of the Composite Analysis) • Central Plateau waste sites • Hanford Site-Wide Monitoring Program • 200 East groundwater	• Composite Analysis (risk assessment and modeling is a subset of the Composite Analysis) • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years • Timeframe link: 1,000 years, then Composite Analysis thereafter • Timeframe link to 100 and 300 Area risk assessment • River Component risk asssessment (current conditions vs. future plume emergence into river)	• Output link to the river is TBD • Input link from 200 East groundwater • Input from all Central Plateau waste sites • Output into cumulative risk assessment

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
17	200-ZP-1 Groundwater OU Baseline Risk Assessment Supporting the CERCLA RI/FS Process: This project will be assessing the baseline risk that groundwater contamination will pose to human health if no action were taken. This baseline risk assessment will take into consideration the contamination that is currently in the groundwater as well as the contamination that vadose zone models predict will eventually reach the groundwater (includes CERCLA source units and tank farms as sources of contamination). POC: Mark Byrnes DOE: Arlene Tortoso	To obtain a CERCLA ROD in 2008. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk at the Columbia River?) 2. If there is unacceptable risks, then determine which remedial alternatives assessed in the FS are protective. 3. What additional remediation is necessary? (Are additional remedial actions needed?)	200-ZP-1, including the 200 West Area. However, the model will predict the movement of contamination to the boundaries of the core zone, boundaries of the Central Plateau, as well as to the Columbia River. The scope predominantly addresses movement and changes in the plume over time in the upper unconfined aquifer.	These studies will evaluate human health impacts from use of groundwater between the down gradient of the OU boundary in vicinity of the 200 West Area to the Columbia River.	These studies will only evaluate human health impacts resulting from use of groundwater. Could also require an ecological impacts (under negotiation).	This study will predict baseline risks associated with SAC modeled groundwater contamination at one worst-case location (e.g., PFP), core zone boundary, Central Plateau boundary, as well as to the Columbia River. The scope predominantly addresses movement in the upper unconfined aquifer.	No ecological receptors impacted by groundwater contamination prior to it reaching the Columbia River. However, if groundwater contamination does reach Columbia River, what is the impact?	Exposure scenarios as defined in HSRAM (DOE-RL 1996) scenarios. For risk estimated within the core zone, will consider the industrial and recreational scenarios. Outside of the core zone, evaluate agricultural and residential scenarios. Scenarios are described further in the September 1999 Letter Report (BHI 1999). Other references for the scenarios include the Hanford Site Risk Assessment Methodology (DOE-RL 1995) and CRCIA, Part II (DOE-RL 1998a). All scenarios referred to above are part and have been parameterized for the majority of the COCs (i.e., Tc-99, U, I-129, H3, CCL4, Cr, and nitrate) within the current SAC risk framework. However, some specific risk data/ information will need to developed for others such as TCE and others that may need to be evaluated.	Human heath impacts will be based on risk assessment methods embodied in the SAC. The SAC makes use of the Human Health Risk Assessment Module (Human Code Version 3.0 [Eslinger 2004]) to estimate cancer and noncancer risks to humans from contaminants in the study region. Water Quality Standards/Metrics: 40 CFR 141 Depth-discrete groundwater sample results to define three-dimensional distribution of COCs, K_d analyses on key COCs, aquifer testing (e.g., slug testing) to define aquifer hydraulic characteristics, other hydraulic and transport inputs (e.g., effective porosity, bulk density, total porosity), particle size distribution data, STOMP and CFEST modeling results using the SAC.	Eco risk will be evaluated if contamination reaches the river (under negotiation).	• Composite Analysis (risk assessment and modeling is a subset of the Composite Analysis) • Central Plateau waste sites • Hanford Site-Wide Monitoring Program • 200 East groundwater	• Composite Analysis (risk assessment and modeling is a subset of the Composite Analysis) • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years • Timeframe link: 1,000 years then Composite Analysis thereafter • Timeframe link to 100 and 300 Area risk assessment • River Component risk assessment (current conditions vs. future plume emergence into river)	• Output link to the River is TBD • Input link from 200 East groundwater • Input link from all Central Plateau waste sites • Output into cumulative risk assessment
18	Central Plateau Ecological Risk Assessment. POC (alt.): Roy Bauer (Randy Ryti, Neptune and Company) DOE: Bryan Foley	To support a CERCLA ROD by TBD. 1. Do the risks to eco receptors require remedial actions on the waste sites? 2. Do the risks to eco receptors in the habitat outside the core zone require remedial actions?	All Central Plateau shallow zone soils.	Ecological risk assessment used to evaluate remedial action at the 200 Area waste sites and to assess eco systems health in Central Plateau.	Eco-risk to shallow soil (0 to 4.6 m [0 to 15 ft]) and biota.	Includes terrestrial ecological receptors.	Excludes human health and groundwater evaluation.	Excluded. See Central Plateau human health risk assessment.	Rad: Exposures to biotic receptors calculated using RESRAD-BIOTA methodology (ISCORS 2004), WAC 173-201A-260, and comparison with Table II in WAC 246-221-290. Non-rad: WAC 173-340-900, Table 749-3 screening values; WAC 173-340-7490 terrestrial ecological evaluation procedures including wildlife exposure model; and comparisons with reference sites.	Terrestrial biota including vegetation, inverts, mice, and lizards.	• Recent reconnaissance • Hanford Site-Wide Monitoring Program • Tank farms	• 200 Area waste sites RI/FS • Tank closure EIS • History matching for Composite Analysis • Cumulative risk assessment • 200 Area groundwater	• Current conditions	• Output link to Composite Analysis • Output link to cumulative risk assessment • Output link to 200 Area groundwater

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
19a	200-CW-1: Central Plateau Waste Sites (completed). POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-CW-1 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris) Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area Groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area Groundwater • Output link into Composite Analysis
19b	200-TW-1: Central Plateau Waste Sites (completed). POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-CW-1 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris). Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site- Wide Monitoring Program • Remedial investigation sampling	• 200-PO-1 groundwater • 200 Area groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200-PO-1 groundwater • Output link to 200 Area groundwater • Output link into Composite Analysis
19c	200-CW-5: Central Plateau Waste Sites (completed). POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-CW-5 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris) Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area groundwater • Output link into Composite Analysis

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
19d	200-CS-1: Central Plateau Waste Sites (completed). POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-CS-1 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris). Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area Groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area groundwater • Output link into Composite Analysis
19e	200-PW-2: Central Plateau Waste Sites (completed). POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-PW-2 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris). Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area groundwater • Output link into Composite Analysis
19f	U Plant: Central Plateau Waste Sites (completed). POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	U Plant soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor)	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris). Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area groundwater • Output link into Composite Analysis

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
19g	100 B/C Cribs: Central Plateau Waste Sites. POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	100 B/C cribs soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris) Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area Groundwater • Output link into Composite Analysis
19h	200-LW-1: Central Plateau Waste Sites. POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in 2008. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-LW-1 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris). Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area Groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area Groundwater • Output link into Composite Analysis
191	200-MW-1: Central Plateau Waste Sites. POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-MW-1 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris). Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site -Wide Monitoring Program • Remedial investigation sampling	• 200 Area groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area groundwater • Output link into Composite Analysis

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
19j	200-IS-1: Central Plateau Waste Sites. POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in 2008. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-IS-1 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris). Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area groundwater • Output link into Composite Analysis
19k	200-UR-1: Central Plateau Waste Sites. POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in 2008. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-UR-1 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris). Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site-Wide Monitoring Program • Remedial investigation sampling	• 200 Area Groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area groundwater • Output link into Composite Analysis
19l	200-SW-2: Central Plateau Waste Sites. POC (alt.): Mary Todd (Roy Bauer) DOE: Bryan Foley	To obtain a CERCLA ROD in TBD. 1. If we do nothing what is the impact? (go or no go) (e.g., is there an unacceptable human health/ecological risk?) 2. What additional remediation is necessary? (Are additional remedial actions needed?)	200-SW-2 waste site soil from 4.6 m (15 ft) to the groundwater interface.	Human health risk assessment used to evaluate remedial action at the 200 Area waste sites.	These studies will only evaluate human health impacts resulting from use of soil only.	Risk to human health of impacts to soil from 4.6 m (15 ft) deep down to groundwater interface.	Excludes eco-risk. No groundwater, no riparian, no biota, no upland soil (River Corridor).	Primary scenarios include industrial only inside core zone with industrial unrestricted surface outside core zone. • Intruder driller • Gardener in cuttings • Intruder trenches • Recreational • Native American (Harper and Harris) Secondary scenarios for information include rural resident farmer outside the core zone.	Screen using RESRAD. Future impacts modeled using STOMP.	Ecological risk will not be evaluated.	• Hanford Site -Wide Monitoring Program • Remedial investigation sampling	• 200 Area groundwater • Central Plateau eco-risk • History matching for Composite Analysis • Cumulative risk assessment	• Current conditions • Future impacts out to 1,000 years	• Output link to 200 Area groundwater • Output link into Composite Analysis

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
					Tank Waste Activities									
20	S-SX FIR (completed; RPP-7884). POC (alt.): Frank Anderson (Fred Mann) DOE: Rob Yasek	1. Determine remediation of S-SX WMA. 2. Determine if additional characterization beyond that planned is required.	S-SX WMA (southern portion of the 200 West Area).	Plume from individual leak or spill.	Groundwater pathway.	Vadose zone to groundwater to Columbia River, with emphasis on WMA fenceline.	Air and intruder pathways excluded. Ecological assessment excluded. Wastes other than past leaks or spill are excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003)	Two-dimensional STOMP calculations for vadose zone and nearby groundwater. Distance groundwater model is stream tube based on Hanford Site Groundwater Model. Dose, ILCR, and hazard index used as metrics.	None.	None.	• Succeeding FIRs • RFI rollup • IDF Performance Assessment • TWRPs • Closure Plans • SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	Awaiting TRD
21	B-BX-BY FIR (completed; RPP-10098). POC (alt.): Frank Anderson (Fred Mann) DOE: Rob Yasek	1. Determine remediation of B-BX-BY WMA. 2. Determine if additional characterization beyond that planned is required.	B-BX-BY WMA (northern portion of 200 East Area).	Plume from individual leak or spill.	Groundwater pathway.	Vadose zone to groundwater to Columbia River, with emphasis on WMA fenceline.	Air and intruder pathways excluded. Ecological assessment excluded. Wastes other than past leaks or spill are excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003)	Two-dimensional STOMP calculations for vadose zone and near-by groundwater. Distance groundwater model is stream tube based on Hanford Site Groundwater Model. Dose, ILCR, and hazard index used as metrics.	None.	Built on previous FIRs.	• Succeeding FIRs • RFI rollup • IDF Performance Assessment • TWRPs • Closure Plans • SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	Awaiting TRD.
22	T, TX-TY FIR. POC (alt.): Frank Anderson (Fred Mann) DOE: Rob Yasek	1. Determine remediation of T and TX-TY WMAs. 2. Determine if additional characterization beyond that planned is required.	T and TX-TY WMAs (northern portion of 200 West Area).	Plume from individual leak or spill.	Groundwater pathway.	Vadose zone to groundwater to Columbia River, with emphasis on WMA fenceline.	Air and intruder pathways excluded. Ecological assessment excluded. Wastes other than past leaks or spill are excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003)	Two-dimensional STOMP calculations for vadose zone and nearby groundwater. Distance groundwater model is stream tube based on Hanford Site Groundwater Model. Dose, ILCR, and hazard index used as metrics.	None.	Built on previous FIRs.	• Succeeding FIRs • RFI rollup • IDF Performance Assessment • TWRPs • Closure Plans • SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	Awaiting TRD.

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
23	A-AX/C/U FIR. POC (alt.): Frank Anderson (Fred Mann) DOE: Rob Yasek	1. Determine remediation of A-AX, C, and U WMAs. 2. Determine if additional characterization beyond that planned is required.	A-AX and C WMAs (eastern portion of 200 East Area) and U WMA (central portion of 200 West Area).	Plume from individual leak or spill.	Groundwater pathway.	Vadose zone to groundwater to Columbia River, with emphasis on WMA fenceline.	Air and intruder pathways excluded. Ecological assessment excluded. Wastes other than past leaks or spill are excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003)	Two-dimensional STOMP. calculations for vadose zone and nearby groundwater. Distance groundwater model is stream tube based on Hanford Site Groundwater Model. Dose, ILCR, and hazard index used as metrics.	None.	Built on previous FIRs.	• Succeeding FIRs • RFI rollup • IDF Performance Assessment • TWRPs • Closure Plans • SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	Awaiting TRD.
24	RFI Rollup. POC (alt.): Frank Anderson (Fred Mann) DOE: Rob Yasek	Determination for remediation of SST WMAs.	All SST WMAs.	Plume from individual leak or spill.	Groundwater pathway.	Vadose zone to groundwater to Columbia River, with emphasis on WMA fenceline.	Air and intruder pathways excluded. Ecological assessment excluded. Wastes other than past leaks or spill are excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Mainly summary of above FIRs.	None.	• FIRs	• IDF Performance Assessment • TWRPs • Closure Plans • SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	Awaiting TRD.
25	2001 ILAW Performance Assessment (completed; DOE/ORP-2000-24 and DOE/EIS-0286). IDF Performance Assessment. POC: Fred Mann DOE: Phil LaMont	Construction of ILAW disposal facility.	ILAW disposal facility (south-central part of 200 East Area).	ILAW package for release; facility level for vadose zone and groundwater transport.	Groundwater, air, and inadvertent intruder.	ILAW.	Limited ecological assessment.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Two-dimensional release calculations (STORM). Vadose zone: two-dimensional using VAM3D. Groundwater: Hanford Site groundwater model.	Limited.	• 1998 ILAW Performance Assessment	• Succeeding IDF assessments	• Current conditions • Future impacts for 10,000 years	
26	IDF Risk Assessment (complete; RPP-15834). IDF Performance Assessment. POC: Fred Mann DOE: Phil LaMont	Construction of IDF.	IDF (south-central part of 200 East Area).	Waste package level for release; facility level for vadose zone and groundwater transport.	Groundwater and inadvertent intruder.	ILAW, Category 1 (LLW) and Category 3 waste (LLW and MLLW).	Ecological assessment excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Two-dimensional release calculations (some use chemically reactive analyses[STORM], while others are analytical); vadose zone: two-dimensional using VAM3D; groundwater: Hanford Site groundwater model	None.	• 2001 ILAW Performance Assessment	• Succeeding IDF assessments	• Current conditions • Future impacts for 10,000 years	

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
27	Down Selection Risk Assessment (complete; RPP-17675). IDF Performance Assessment. POC: Fred Mann DOE: Phil LaMont	Type of Supplement ILAW.	IDF (south-central part of 200 East Area).	Waste package level for release; facility level for vadose zone and groundwater transport.	Groundwater and inadvertent intruder.	ILAW, Supplemental ILAW, and secondary waste from their production.	Ecological assessment excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Two-dimensional release calculations (some use chemically reactive analyses [STORM], while others are analytical). Vadose zone: two-dimensional using VAM3D. Groundwater: Hanford Site groundwater model.	None.	• 2001 ILAW Performance Assessment • IDF risk assessment	• IDF Performance Assessments	• Current conditions • Future impacts for 10,000 years	
28	IDF Performance Assessment. POC: Fred Mann DOE: Phil LaMont	Operation and closure of the IDF.	IDF (south-central part of 200 East Area).	Waste package level for release; facility level for vadose zone and groundwater transport.	Groundwater, air, and inadvertent intruder.	ILAW, Supplemental ILAW, Category 1 (LLW) and Category 3 waste (LLW and MLLW).	Limited ecological analysis in initial versions. Will build on Central Plateau ecological risk assessment.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Two-dimensional release calculations (some use chemically reactive analyses [STORM], while others are analytical). Vadose zone: two-dimensional using VAM3D. Groundwater: Hanford Site groundwater model.	TBD.	• 2001 ILAW Performance Assessment • IDF risk assessment • Down selection risk assessment	• TWRPs • Closure Plans • SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	
29	TWRPs. POC (alt): Mike Connelly (Fred Mann) DOE: Bob Lober	Tri-Party Agreement requirement: Retrieval of waste from a set of tank farm components.	Usually a single tank or a small number of tanks in a single farm.	Hypothetical tank leak and amount of residue. Also analysis of entire WMA. Results are based on existing analyses.	Groundwater pathway.	Vadose zone to groundwater.	Ecological assessment excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Based on existing analyses. Goal is that it will be based on Ecology tank farm (SST and tank farms) performance assessments.	None.	• FIRs • WMA C Performance Assessment • WMA S/SX Risk Assessment (goal is for these to be a subset of the SST Performance Assessment and Tank Farms Performance Assessment)	• Closure Plans • SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	
30	Preliminary Performance Assessment for WMA C at the Hanford Site, Washington (DOE/ORP-2003-11). POC (alt): Mike Connelly (Fred Mann) DOE: Bob Lober	What is the impact to the human health closure of C Tank Farm? The requirements address RCRA, CERCLA, and DOE O 435.1.	C Tank Farm (northeast corner of the 200 East Area).	Each tank and spill considered. Residual waste in infrastructure treated on farm basis.	Groundwater, air, and inadvertent intruder pathways.	Vadose zone to groundwater to Columbia River, with emphasis on farm fenceline.	Ecological assessment excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Two-dimensional STOMP calculations for vadose zone and nearby groundwater. Distance groundwater model is stream tube based on Hanford Site Groundwater Model. Dose, ILCR, and hazard index used as metrics.	None.	• S/SX FIR • B/BX/BY FIR	• Closure Plans • SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	• SST Performance Assessment • Tank Closure EIS • Tank Farms Performance Assessment • Composite Analysis

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
31	Risk Assessments for Closure Plans: Close individual components of tank farm systems. POC (alt): Mike Connelly (Fred Mann) DOE: Bob Lober	What is the impact to human health from closure of tank farm components (including SSTs, DSTs, pipelines, and associated facilities). The requirements address RCRA, CERCLA, and DOE O 435.1.	Usually a single tank or a small number of tanks in a single farm.	Components inside the WMA (based on existing analyses).	Groundwater and inadvertent intruder pathways.	Vadose zone to groundwater to Columbia River, with emphasis on each WMA fenceline.	Ecological assessment excluded in initial versions. Will build on Central Plateau Ecological Risk Assessment.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Based on existing analyses. Goal is that it will be based on Ecology tank farm (SST and tank farms) performance assessments.	Initially none. Later versions TBD.	• Tank Farms Performance Assessment • SST Performance Assessment (this assessment is really a subset of the SST Performance Assessment and Tank Farms Performance Assessment)	None.	• Current conditions • Future impacts for 10,000 years	• SST Performance Assessment • Tank Closure EIS • Composite Analysis • Tank Farms Performance Assessment
32	Risk Assessment for WMA S-SX Closure Plan (RPP-21596). POC (alt): Mike Connelly (Fred Mann) DOE: Bob Lober	RCRA Closure of S-SX WMA.	S/SX WMA (southern part of the 200 West Area).	Each tank and spill considered. Residual waste in infrastructure treated on farm basis.	Groundwater and inadvertent intruder pathways.	Vadose zone to groundwater to Columbia River, with emphasis on WMA fenceline.	Ecological assessment excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Two-dimensional STOMP calculations for vadose zone and nearby groundwater. Distance groundwater model is stream tube based on Hanford Site groundwater model. Dose, ILCR, and hazard index used as metrics.	None.	• S/SX FIR • B/BX/BY FIR	• SST Performance Assessment • Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	
33	SST Performance Assessment. POC (alt): Mike Connelly (Fred Mann) DOE: Bob Lober	RCRA closure of SST farms.	All SSTs (located in both the 200 West and 200 East Areas).	Each tank and spill considered. Residual waste in infrastructure treated on farm basis.	Groundwater, air, and inadvertent intruder pathways.	Vadose zone to groundwater to Columbia River, with emphasis on each WMA fenceline.	Ecological assessment excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003)	Two-dimensional STOMP calculations for vadose zone and nearby groundwater. Distance groundwater model is stream tube based on Hanford Site Groundwater Model. Dose, ILCR, and hazard index used as metrics.	None.	• WMA C Performance Assessment • WMA S/SX Risk Assessment • Tank Closure EIS	• Tank Farms Performance Assessment • History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	• Tank Closure EIS • Composite Analysis • Tank Farms Performance Assessment
34	Tank Farm Performance Assessment. POC (alt): Mike Connelly (Fred Mann) DOE: Bob Lober	What is the impact to the human health closure of the entire tank farm system (including SSTs, DSTs, pipelines, and associated facilities)? The requirements address RCRA, CERCLA, and DOE O 435.1.	All tank farm system components (located in 200 West and East Areas as well as between the two areas).	Each tank and spill considered. Residual waste in infrastructure treated on farm basis.	Groundwater, air, and inadvertent intruder pathways.	Vadose zone to groundwater to Columbia River, with emphasis on each WMA fenceline.	Ecological assessment excluded in initial versions. Will build on Central Plateau Ecological Risk Assessment.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Two-dimensional STOMP calculations for vadose zone and nearby groundwater. Distance groundwater model is stream tube based on Hanford Site Groundwater Model. Dose, ILCR, and hazard index used as metrics.	TBD.	• WMA C Performance Assessment • WMA S/SX Risk Assessment • SST Performance Assessment • Tank Closure EIS	• History matching for Composite Analysis	• Current conditions • Future impacts for 10,000 years	• Tank Closure EIS • SST Performance Assessment • Composite Analysis
35	Retrieval Data Reports: Documents completion of tank-specific (or component-specific) waste retrieval activity. POC (alt): Mike Connelly (Fred Mann) DOE: Bob Lober	Retrieval volume goal process set by the Tri-Party Agreement: Whether retrieval of waste is complete as determined by using the Tri-Party Agreement, Appendix H, waiver process.	Usually a single tank or a small number of tanks in a single farm.	Measured residual inventory in the tank(s) and any leak(s) that occurred during retrieval. Results are presented in terms of the WMA (based on existing analyses).	Groundwater and inadvertent intruder pathways.	Vadose zone to groundwater to Columbia River, with emphasis on each WMA fenceline.	Ecological assessment excluded.	*Exposure Scenarios and Unit Dose Factors for Hanford Waste Tank Performance Assessments* (Rittmann 2003).	Based on existing analyses. Goal is that it will be based on Ecology tank farm (SST and tank farms) performance assessments.	None.	• WMA C Performance Assessment • WMA S/SX Risk Assessment	• History matching for Composite Analysis • SST Performance Assessment • Tank Farms Performance Assessment	• Current conditions • Future impacts for 10,000 years	
36	Tank Closure EIS. POC (alt.): DOE: Mary Beth Burandt	Alternative analysis for tank closure.	[No Information Reported]								None.	None.		• Composite Analysis • Tank Farms Performance Assessment • SST Performance Assessment

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods and Models used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues
37	Waste Treatment Plant Operation Assessment. POC (alt.): Phil Peistrup DOE: Woody Russell	Decision by Ecology to approve operation of the WTP.	On and off the Hanford Site, soil and surface water.	Human health and ecological risk assessment used to evaluate impact of air emissions from WTP on and off the Hanford Site.	Biota (e.g., vegetation, invertebrates, mammals, birds, mammals), soil, sediment, and surface water on and off the Hanford Site and on the Columbia River.	Terrestrial and aquatic environments.	Groundwater.	**Human Receptors:** • Hanford Site Industrial Worker • Resident adult • Resident child • Nursing infant of resident • Resident subsistence farmer adult • Resident subsistence farmer child • Resident subsistence fisher adult • Resident subsistence fisher child • Native American hunter/gatherer adult • Native American hunter/gatherer child • Nursing infant of Native American hunter/gatherer	**EPA Guidance Documents:** • Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (peer review draft, EPA530-D-98-001A, B, and C), July 1998 • Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (peer review draft, EPA530-D-99-001A), August 1999 • Native American (Harper and Harris) **Human Health Pathways:** • Inhalation of emissions • External exposure to emissions • Ingestion of soil • Inhalation of resuspended dust • External exposure to soil • Ingestion of locally grown produce and wild plants • Ingestion of beef, pork, and wild game • Ingestion of dairy products • Ingestion of poultry, wildfowl, and eggs • Ingestion of fish **Ecological Pathways:** • Direct exposure to soil • Ingestion of soil • Ingestion of soil invertebrates • Ingestion of plants • Ingestion of prey animals • Ingestion of surface water • Ingestion of aquatic organisms	**Ecological Receptors:** • Terrestrial plants • Soil invertebrates • Mule deer • Mourning dove • Great Basin pocket mouse • Western meadowlark • Coyote • Burrowing owl • Red-tailed hawk • Benthic invertebrates: clams, insects, snails, worms • Aquatic biota: small bluegill, small carp, small northern squawfish, small suckers, water fleas, and many other invertebrates (e.g., zooplankton) • Salmonids • Canada goose • Spotted Sandpiper • Great blue heron • Mink	None.		• Current scenario during WTP operations • Future scenario following completion of WTP operations	

Hanford Site Risk Assessment Integration Project Summary

#	Project Title and Scope Statement	What Decision is this Risk Assessment Supporting	Geographical Scope	Study Resolution	Media Included	Specific Scope Included	Specific Scope Exclusions	Human Health Risk Scenarios Used	Risk Evaluation Methods, Models, and Standards of Protectiveness used in Risk Evaluation	Ecological Endpoints Evaluated	Links and Inputs Needed from Other Risk Assessments	Links and Outputs Relevant to Other Risk Assessments	Risk Evaluation Timeframe and Timeframe Links	Integration Issues

ALE	Arid Lands Ecology Reserve	ERDF	Environmental Restoration Disposal Facility	MCL	maximum contaminant level
BHI	Bechtel Hanford, Inc.	FFTF	Fast Flux Test Facility	MLLW	mixed low-level waste
BIOTA	(computer code)	FH	Fluor Hanford	NPDES	National Pollutant Discharge Elimination System
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*	FIR	field investigation report	ORP	Office of River Protection
CFEST	(computer code) coupled, fluid, energy, and solute transport	FS	feasibility study	OU	operable unit
CHI	CH2M HILL Hanford, Inc.	FY	fiscal year	PFP	Plutonium Finishing Plant
COC	contaminant of concern	GPR	ground penetrating radar	PNNL	Pacific Northwest National Laboratory
COPC	contaminant of potential concern	HEIS	Hanford Environmental Information System	POC	point of contact
D&D	decontamination and decommissioning	HSBRAM	Hanford Site Baseline Risk Assessment Methodology	RAO	remedial action objective
DOE	U.S. Department of Energy	HSRAM	Hanford Site Risk Assessment Methodology	RCRA	*Resource Conservation and Recovery Act of 1976*
DQO	data quality objective	HTWOS	Hanford Tank Waste Operations Simulator	RESRAD	RESidual RADioactivity (dose model)
DST	double-shell tank	IDF	integrated disposal facility	RFI	remedial field investigation
ECEM	Ecological Contaminant Model	ILAW	immobilized low-activity waste	RI/FS	remedial investigation/feasibility study
Ecology	Washington State Department of Ecology	ILCR	incremental lifetime cancer risk	RL	DOE, Richland Operations Office
EIS	environmental impact statement	K_d	distribution coefficient	ROD	record of decision
EPA	U.S. Environmental Protection Agency	LLW	low-level waste		

RPP	(as in report; RPP-14555)
SAC	System Assessment Capability
SALDS	State-Approved Land Disposal Site
SAP	sampling and analysis plan
SST	single-shell tank
STOMP	(computer code)
TBD	to be determined
TCE	trichloroethylene
TRD	technical review document
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TWRP	tank waste retrieval work plan
WAC	*Washington Administrative Code*
WIDS	Waste Information Data System
WMA	waste management area
WTP	Waste Treatment Plant

REFERENCES

40 CFR 141, "Federal Safe Drinking Water Act," *Code of Federal Regulations,* as amended.

ANL, 2001, *User's Manual for RESRAD Version 6*, ANL/EAD-4, Argonne National Laboratory, Chicago, Illinois.

ANL, 2004, *RESRAD for Windows*, Version 6.22, Argonne National Laboratory, Environmental Assessment Division, Argonne, Illinois.

Becker, 1998, "Species Selection for an Ecological Risk Assessment of the Columbia River at the Hanford Site, Washington, USA", Environmental Toxicology and Chemistry 17:2354-2357, Pacific Northwest National Laboratory, Richland, WA.

Brandt, 2004, "History Matching of ECEM (Ecological Contaminant Model)", Presentation to EPA and USGS, Pacific Northwest National Laboratory, Richland, Washington.

Bryce, R. W., C. T. Kincaid, P. W. Eslinger, and L. F. Morasch, 2002, *An Initial Assessment of Hanford Impact Performed with the System Assessment Capability*, PNNL-10427, Pacific Northwest National Laboratory, Richland, Washington.

Clean Air Act of 1955, 42 U.S.C. 7401, et seq.

Clean Water Act of 1977, 33 U.S.C. 1251, et seq.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. 9601, et seq.

DOE M 435.1-1, *Radiactive Waste Management Manual*, U.S. Department of Energy, Washington, D.C.

DOE O 435.1, *Radioactive Waste Management*, U.S. Department of Energy, Washington, D.C.

DOE, 1999, *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement*, DOE/EIS-0222-F, U.S. Department of Energy, Washington, D.C.

DOE, 2001, *Hanford Immobilized Low-Activity Waste Performance Assessment: 2001 Version*, DOE/ORP-2000-24, Rev. b, U.S. Department of Energy, Office of River Protection, Richland, Washington.

DOE, 2002, *A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota*, DOE-STD-1153-2002, DOE Technical Standard, U.S. Department of Energy, Washington, D.C.

DOE, 2002, *Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement*, DOE/EIS-0286, Draft, U.S. Department of Energy, Washington, D.C.

DOE, 2003, *Preliminary Performance Assessment for Waste Management Area C at the Hanford Site, Washington*, DOE/ORP-2003-11, Rev. 0, U.S. Department of Energy, Office of River Protection, Richland, Washington.

DOE-RL, 1995, *Hanford Site Risk Assessment Methodology,* DOE/RL-91-45, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1995, *Hanford Site risk Assessment Methodology*, DOE/RL-91-45, Rev. 3, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE-RL, 1998, *Screening Assessment and Requirements for a Comprehensive Assessment: Columbia River Comprehensive Impact Assessment*, DOE/RL-96-16, Rev. 1, U.S. Department of Energy, Richland Operation Office, Richland, Washington.

EPA, 1989, *Risk Assessment Guidance for Superfund,* Volume I, "Human Health Evaluation Manual (Part A)," EPA/540/1-89/002, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1991, Risk *Assessment Guidance for Superfund, Volume I - Human Health Evaluation Manual (Part B, Development of Primary Remediation Goals),* Interim, Publication 9285.7-018, EPA/540/R-92/003, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1994a, *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children,* NTIS No. PB93-963510, OSWER 285.7-15-1, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1994b, *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities,* EPA/540/F-94/043, OSWER Directive 9355.4-12, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1996, *Proposed Guidelines for Carcinogen Risk Assessment*, EPA/600/P-92/003C, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1997a, Ecological *Risk Assessment Guidance for Superfund: Process for Design and Conducting Ecological Risk Assessments,* Interim Final, EPA 540-R-97-006, U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1997b, *EPA Region 10 Supplemental Ecological Risk Assessment Guidance for Superfund*, EPA 910-R-97-005, U.S. Environmental Protection Agency, Region 10, Seattle, Washington.

EPA, 1997c, *Health Effects Assessment Summary Tables (HEAST) FY 1997 Update,* EPA/540/R-97-036-PB97-921199, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1997d, *Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination,* OSWER Directive 9200.4-18, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1998, *Guidelines for Ecological Risk Assessment*, EPA/630/R095/002F, U.S. Environmental Protection Agency, Risk Assessment Forum, Washington, D.C.

EPA, 1999a, *Ecological Risk Assessment and Risk Management Principles for Superfund Sites,* Memorandum from S. D. Luftig, Director, Office of Emergency and Remedial Response to Superfund National Policy Managers Regions 1-10, OSWER Directive 9285.7-28 P, Signed October 7, 1999, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 1999b, *Interim Remedial Action Record of Decision for the 100-NR-1 and 100-NR-2 Operable Units*, EPA/541/R-99/112, U.S. Environmental Protection Agency Region 10, Seattle, Washington.

EPA, 2001a, *Declaration of the Interim Remedial Action Record of Decision for the 300-FF-2 Operable Unit*, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2001b, *Reuse Assessments: A Tool to Implement the Superfund Land Use Directive,* OSWER 9355.7-06P, Memorandum from L. Reed, Office of Emergency and Remedial Response, to Superfund National Policy Managers Regions 1-10, Signed June 4, 2001, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2001c, *The Radionuclide Table: Radionuclide Carcinogenicity – Slope Factors*, Federal Guidance Report No. 13 (April 16, 2001 update), U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2002a, *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites*, OSWER 9285.6-10, U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2002b, EPA *Region IX Preliminary Remediation Goals Toxicity Factor Tables,* U.S. Environmental Protection Agency, Washington, D.C.

EPA, 2004, Integrated *Risk Information System (IRIS),* U.S. Environmental Protection Agency, Washington, D.C.

Harris, S., and B. Harper, 1997, "A Native American Exposure Scenario," *Risk Analysis*, Vol. 17, No. 6, p. 789-795.

IAEA, 1992, *Effects of Ionizing Radiation on Plants and Animals at Levels Implied by Current Radiation Protection Standards*, International Atomic Energy Agency, Vienna, Austria.

ISCORS 2004, *RESRAD-BIOTA: A Tool for Implementing a Graded Approach to Biota Dose Evaluation,* Users Guide, Version 1, DOE/EH-0676, Interagency Steering Committee on Radiation Standards, U.S. Department of Energy, Washington D.C.

Patton G. W., B. L. Tiller, E. J. Antonio, T. M. Poston, and S. P. Van Verst, 2003, *Survey of Radiological and Chemical Contaminants in the Near-Shore Environment at the Hanford Site 300 Area*, PNNL-13692, Rev. 1, Pacific Northwest National Laboratory, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6901, et seq.

Rittmann, P. D., 2003, *Exposure Scenarios and Unit Dose Factors for Hanford Tank Waste Performance Assessments*, HNF-SD-WM-TI-707, Rev. 3, Fluor Federal Services, Inc., Richland, Washington.

RPP-10098, 2002, *Field Investigation Report for Waste Management Area B-BX-BY*, Rev. 0, CH2M HILL Hanford Group, Richland, Washington.

RPP-15834, 2003, *Integrated Disposal Facility Risk Assessment*, Rev. 0, CH2M HILL Hanford Group, Richland, Washington.

RPP-17675, 2003, *Risk Assessment Supporting the Decision on the Initial Selection of Supplemental ILAW Technologies*, Rev. 0, CH2M HILL Hanford Group, Richland, Washington.

RPP-7884, 2002, *Field Investigation Report for Waste Management Area S-SX*, Rev. 0, CH2M HILL Hanford Group, Richland, Washington.

Safe Drinking Water Act, 40 U.S.C. 300, et seq.

Soldat, J.K., N.M. Robinson, and D.A. Baker, 1974, *Models and Computer Codes for Evaluating Environmental Radiation Doses,* BNWL-1754, Battelle Pacific Northwest Laboratories, Richland, Washington.

VanVerst, S. P., C. L. Albin, G. W. Patton, M. L. Blanton, T. M. Poston, A. T. Cooper, and E. J. Antonio, 1998, *Survey of Radiological Contaminants in the Near-Shore Environment at the Hanford Site 100-N Reactor Area,* PNNL-11933, Pacific Northwest National Laboratory, Richland, WA.

WAC 173-201A, "Water Quality Standards for Surface Waters of the State of Washington," *Washington Administrative Code*, as amended.

WAC 173-340, "Model Toxics Control Act--Cleanup," *Washington Administrative Code*, as amended.

WAC 246-221, "Radiation Protection Standards," *Washington Administrative Code*, as amended.

APPENDIX B

CLEANUP VERIFICATION PACKAGE DOCUMENTS

Appendix B – Cleanup Verification Package Documents

Table B-1. Catalog of Cleanup Verification Package Documents. (6 Pages)

CVP No.	Revision/ Draft No.	Date Published	No. Copies	Title
CVP-2004-00005	Rev. 0	July 2004	2	Cleanup Verification Package for the 118-C-2 Burial Ground
CVP-2004-00001	Rev. 0	April 2004		Cleanup Verification Package for the 116-KW-3 Retention Basin
CVP-2003-00024	Rev. 0	April 2004		Cleanup Verification Package for the 116-K-1 Crib
CVP-2003-00021	Rev. 0	July 2004		Cleanup Verification Package for the 618-5 Burial Ground
CVP-2003-00020	Rev. 0	July 2004		Cleanup Verification Package for the 618-4 Burial Ground
CVP-2003-00019	Rev. 0	Feb 2004	1	Cleanup Verification Package for the 100-B-8:2, 100-C-6:2, 100-C-6:3, and 100-C-6:4 100-B/C North Effluent Pipelines
CVP-2003-00018	Rev. 0	Feb 2004		Cleanup Verification Package for the 105-DR Large Sodium Fire Facility (122-DR-1:2, 100-D-53/122-DR-1:4, 132-DR-2/122-DR-1:5), the 119-DR Exhaust Stack Sampling Building (100-D-64), and the 100-D-23 and 100-D-54 Dry Wells
CVP-2003-00017	Rev. 0	Feb 2004		Cleanup Verification Package for the 118-F-8:1, 105-F Reactor Below-Grade Structures and Underlying Soils; the 118-F-8:3, 105-F Fuel Storage Basin Underlying Soils; and the 100-F-10 French Drain
CVP-2003-00016	Rev. 0	Dec 2003	2	Cleanup Verification Package for the 118-DR-2:2, 105-DR Reactor Below-Grade Structures and Underlying Soils, and the 100-D49:4 Reactor Cooling Water Effluent Underground Pipeline
CVP-2003-00015	Rev. 0	Aug 2003	1	Cleanup Verification Package for the 118-C-4, 105-C Horizontal Control Rod Cave
CVP-2003-00014	Rev. 0	Sept 2003	1	Cleanup Verification Package for the 100-B-5 Effluent Vent Disposal Trench
CVP-2003-00012	Rev. 0	July 2003	1	Cleanup Verification Package for the 100-F-24, 145-F Drywell
CVP-2003-00011	Rev. 0	July 2003	1	Cleanup Verification Package for the 100-F-23, 141-C Drywell
CVP-2003-00010	Rev. 0	July 2003	1	Cleanup Verification Package for the 100-F-25, 146-FR Drywells and the UPR-100-F-3 Mercury Spill
CVP-2003-00009	Rev. 0	August 2003	2	Cleanup Verification Package for the 100-C-3 French Drain-

Appendix B – Cleanup Verification Package Documents

Table B-1. Catalog of Cleanup Verification Package Documents. (6 Pages)

CVP No.	Revision/ Draft No.	Date Published	No. Copies	Title
CVP-2003-00008	Rev. 0	August 2003	1	Cleanup Verification Package for the 1607-B11 Septic Tank System
CVP-2003-00007	Rev. 0	August 2003	1	Cleanup Verification Package for the 1607-B10 Septic Tank System
CVP-2003-00006	Rev. 0	August 2003	1	Cleanup Verification Package for the 1607-B9 Septic Tank System
CVP-2003-00005	Rev. 0	August 2003	1	CVP for the 1607-B8 Septic Tank System
CVP-2003-00004	Rev. 0	August 2003	1	Cleanup Verification Package for the 1607-B7 Septic Tank System
CVP-2003-00003	Rev. 0	June 2003	2	Cleanup Verification Package for the 116-F-10, 105-F Dummy Decontamination French Drain
CVP-2003-00002	Rev. 0	July 2003	1	Cleanup Verification Package for the South Process Pond (WIDS Site 316-1, the Retired Filter Backwash Pond (WIDS Site 300 RFBP), 300-262 Contaminated Soil, and Unplanned Release Sites UPR-300-32, UPR-300-33, UPR-300-34, UPR-300-35, UPR-300-36, UPR-300-37, and UPR-300-FF-1
CVP-2003-00001	Rev. 0	July 2003	1	Cleanup Verification Package for Landfill 1D (WIDS Site 628-4)
CVP-2002-00010	Rev. 0	Nov 2003	2	Cleanup Verification Package for the 116-F-6 Liquid Waste Disposal Trench
CVP-2002-00009	Rev. 0	Nov 2003	2	Cleanup Verification Package for the 116-F-1 Lewis Canal
CVP-2002-00008	Rev. 0	June 2003	1	Cleanup Verification Package for the 116-F-3 Fuel Storage Basin Trench
CVP-2002-00007	Rev. 0	June 2003	1	Cleanup Verification Package for the 100-F-35 Soil Contamination Site
CVP-2002-00005	Rev. 0	March 2003	1	Cleanup Verification Package for the 1607-F2 Septic System
CVP-2002-00003	Rev. 0	July 2002	1	Cleanup Verification Package for the 116-B-7, 132-B-6, and 132-C-2 B/C Outfalls
CVP-2002-00002	Rev. 0	Dec 2002	1	CVP/Clean Closure Report for the Soil Column of the 116-N-3 Trench, Crib, and 100-N-63:1 Pipeline
CVP-2002-00001	Rev. 0	July 2002	1	Cleanup Verification Package for the 100-F-4, 100-F-11, 100-F-15, and 100-F-16 French Drains
CVP-2001-00021	Rev. 0	March 2002	1	CVP/Clean Closure Report for the Soil Column of the 120-N-1 and 120-N-2 Dangerous Waste Treatment Disposal Sites and the 100-N-58 Site

Appendix B – Cleanup Verification Package Documents

Table B-1. Catalog of Cleanup Verification Package Documents. (6 Pages)

CVP No.	Revision/ Draft No.	Date Published	No. Copies	Title
CVP-2001-00020	Rev. 0	Dec 2001	1	Cleanup Verification Package for the 600-23 Dumping Area
CVP-2001-00019	Rev. 0	Nov 2001	1	Cleanup Verification Package for the JA Jones 1 Site
CVP-2001-00011	Rev. 0	April 2002	1	Cleanup Verification Package for the UPR-100-F-2 Basin Leak Ditch
CVP-2001-00010	Rev. 0	Nov 2001	1	Cleanup Verification Package for the 1607-F6 Septic System and Pipelines
CVP-2001-00009	Rev. 0	July 2002	1	Cleanup Verification Package for the 116-F-14 Retention Basin
CVP-2001-00008	Rev. 0	Oct 2002	1	Cleanup Verification Package for the 116-F-9 Animal Waste Leaching Trench
CVP-2001-00007	Rev. 0	August 2001	1	Cleanup Verification Package for the 116-F-5 Ball Washer Crib
CVP-2001-00006	Rev. 0	Nov 2001	1	Cleanup Verification Package for the 116-F-4 Pluto Crib
CVP-2001-00005	Rev. 0	March 2003	2	Cleanup Verification Package for the 116-F-2, 107-F Liquid Waste Disposal Trench
CVP-2001-00003	Rev. 0	July 2003	1	Cleanup Verification Package for the 100-F-19:2 Reactor Cooling Water Effluent Pipeline, 116-F-11 Cushion Corridor French Drain, UPR-100-F-1 Sewer Line Leak, and 100-F-29 Experimental Animal Farm Process Sewer Pipelines
CVP-2001-00002	Rev. 0	May 2002	1	Cleanup Verification Package for the 100-F-19:1 and 100-F-19:3 Reactor Cooling Water Effluent Pipelines, 100-F-34 Biology Facility French Drain, and 116-F-12 French Drain
CVP-2001-00001	Rev. 0	July 2002	1	Cleanup Verification Package for the 100-F-2 Strontium Garden
CVP-2000-00034	Rev. 0	April 2001	1	Cleanup Verification Package for the 100-D and 100-DR Group 3 Pipelines (100-D-48:3 and 100-D-49:3) and 100-D-5 and 100-D-6 Burial Grounds
CVP-2000-00033	Rev. 0	April 2001	1	Cleanup Verification Package for the 100-D-48:4 Small Cooling Water Effluent Pipelines
CVP-2000-00032	Rev. 0	April 2001	1	Cleanup Verification Package for the 116-H-3 French Drain

Appendix B – Cleanup Verification Package Documents

Table B-1. Catalog of Cleanup Verification Package Documents. (6 Pages)

CVP No.	Revision/ Draft No.	Date Published	No. Copies	Title
CVP-2000-00031	Rev. 0	March 2001	1	Cleanup Verification Package for the 100-H-17 Overflow, 116-H-2 Liquid Waste Disposal Trench, 100-H-2 Buried Thimble Site, and the 100-H-30 Sanitary Sewer Trench
CVP-2000-00030	Rev. 0	May 2001	1	Cleanup Verification Package for the 100-H-24 Substation
CVP-2000-00029	Rev. 0	March 2001	1	Cleanup Verification Package for the 100-H-21 Reactor Effluent Pipelines, 100-H-22 Effluent Pipeline Leakage, and 100-H-1 Rod Cave
CVP-2000-00028	Rev. 0	Dec 2000	1	Cleanup Verification Package for the 100-H-5 Sludge Disposal Trench
CVP-2000-00027	Rev. 0	July 2001	1	Cleanup Verification Package for the 116-H-7 Retention Basin
CVP-2000-00026	Rev. 0	April 2001	1	Cleanup Verification Package for the 116-H-1 Process Effluent Trench
CVP-2000-00025	Rev. 0	Feb 2001	1	Cleanup Verification Package for the 1607-H4 Septic System
CVP-2000-00024	Rev. 0	Feb 2001	1	Cleanup Verification Package for the 1607-H2 Septic System
CVP-2000-00021	Rev. 0	May 2003	1	Cleanup Verification Package for Landfill 1B (WIDS Site 300-50)
CVP-2000-00020	Rev. 0	May 2003	1	Cleanup Verification Package for Landfill 1A (WIDS Site 300-49)
CVP-2000-00019	Rev. 0	Sept 2000	1	Cleanup Verification Package for the 116-DR-7 Inkwell Crib
CVP-2000-00018	Rev. 0	Nov 2000	1	Cleanup Verification Package for the 100-D-52 Drywell
CVP-2000-00016	Rev. 0	Oct 2000	1	Cleanup Verification Package for the 100-D-12 Sodium Dichromate Pump Station
CVP-2000-00015	Rev. 0	Oct 2000	1	Cleanup Verification Package for the 116-DR-4 Pluto Crib
CVP-2000-00014	Rev. 0	Oct 2000	1	Cleanup Verification Package for the 116-DR-6 Liquid Disposal Trench
CVP-2000-00013	Rev. 0	Oct 2000	1	Cleanup Verification Package for the 116-D-2 Pluto Crib
CVP-2000-00012	Rev. 0	March 2001	1	Cleanup Verification Package for the 116-D-9 Crib and Pipeline

Appendix B – Cleanup Verification Package Documents

Table B-1. Catalog of Cleanup Verification Package Documents. (6 Pages)

CVP No.	Revision/ Draft No.	Date Published	No. Copies	Title
CVP-2000-00010	Rev. 0	March 2001	1	Cleanup Verification Package for the 116-D-1A/116-D-1B Storage Basin Trenches and 100-D-46 Burial Ground
CVP-2000-00009	Rev. 0	Nov 2000	1	Cleanup Verification Package for the 116-D-6 French Drain
CVP-2000-00008	Rev. 0	Oct 2000	1	Cleanup Verification Package for the 116-D-4 Crib
CVP-2000-00005	Rev. 0	Sept 2000	1	Cleanup Verification Package for the D and DR Group 2 Pipelines (100-D-48:2/49:2) and Unplanned Release Sites (UPR-100-D-2 and UPR-100-D-3)
CVP-2000-00004	Rev. 0	Sept 2000	1	Cleanup Verification Package for the 1607-D2 Septic Pipelines
CVP-2000-00003	Rev. 0	March 2001	1	Cleanup Verification Package for the D and DR Group 2 North Pipelines (100-D-48:1/49:1), 100-D-19 Sludge Trench, and UPR-100-D-4 Unplanned Release Site
CVP-2000-00002	Rev. 0	Sept 2000	1	Cleanup Verification Package for the 116-DR-1&2 Process Effluent Trenches
CVP-2000-00001	Rev. 0	Sept 2000	1	Cleanup Verification Package for the 100-D-18 Sludge Trench
CVP-99-00019	Rev. 0	March 2000	1	Cleanup Verification Package for the 116-C-2A Pluto Crib, 116-C-2B Pump Station, 116-C-2C Sand Filter, and Overburden Soils from Group 3 Sites at the 100B/C Area
CVP-99-00017	Rev. 0	Feb 2000	1	Cleanup Verification Package for the 116-B-6B Crib
CVP-99-00015	Rev. 0	Feb 2000	1	Cleanup Verification Package for the 116-B-2 Fuel Storage Basin Trench
CVP-99-00014	Rev. 0	Feb 2000	1	Cleanup Verification Package for the 116-B-4 French Drain
CVP-99-00013	Rev. 0	Feb 2000	1	Cleanup Verification Package for the 116-B-3 Pluto Crib
CVP-99-00012	Rev. 0	Dec 1999	1	Cleanup Verification Package for the 116-B-1 Process Effluent Trench
CVP-99-00011	Rev. 0	May 1999	1	Cleanup Verification Package for the 116-B-6A Crib and 116-B-16 Fuel Examination Tank
CVP-99-00010	Rev. 0	Feb 2000	1	Cleanup Verification Package for the 116-B-10 Dry Well/Quench Tank
CVP-99-00009	Rev. 0	Feb 2000	1	Cleanup Verification Package for the 116-B-9 French Drain

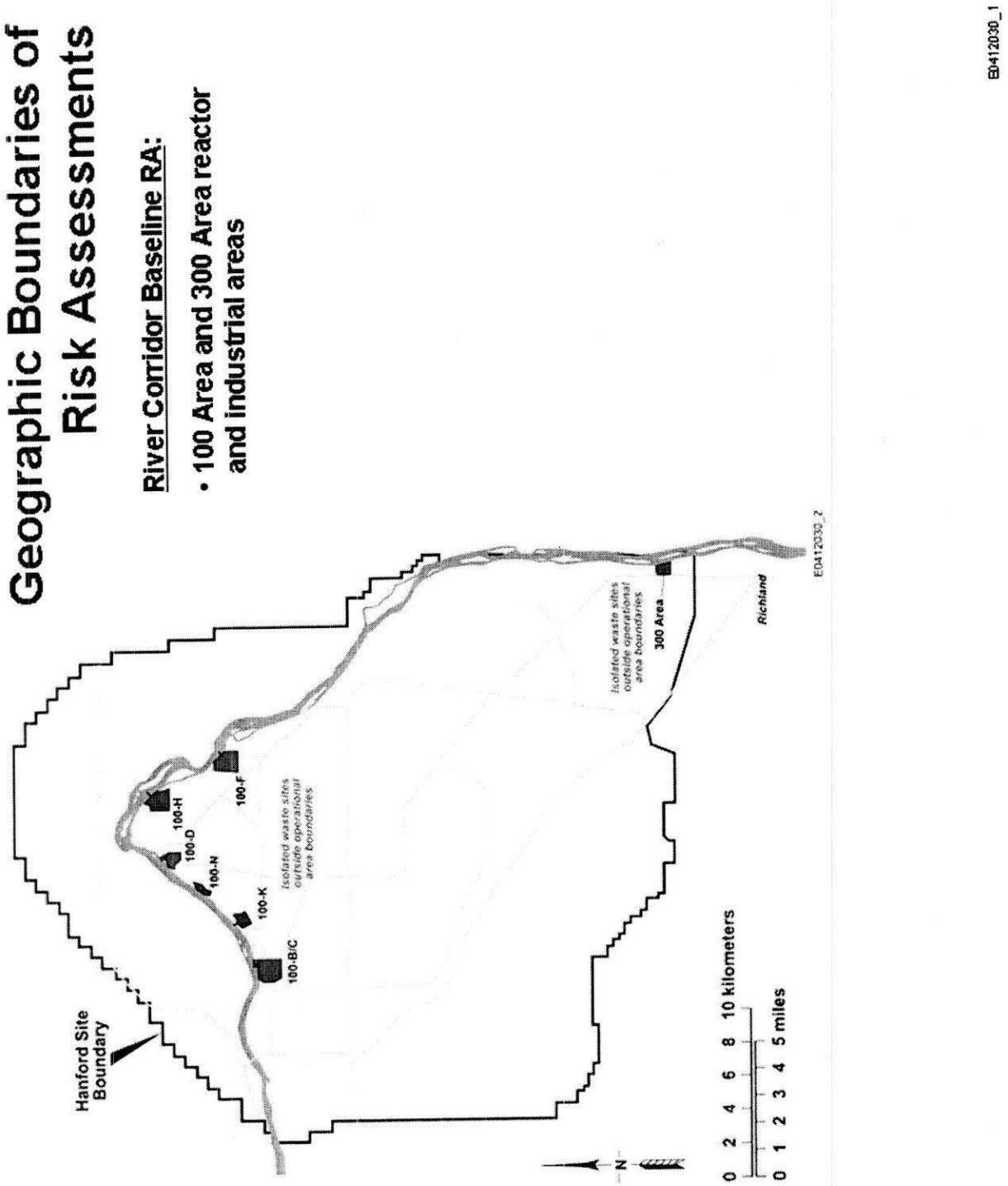
Table B-1. Catalog of Cleanup Verification Package Documents. (6 Pages)

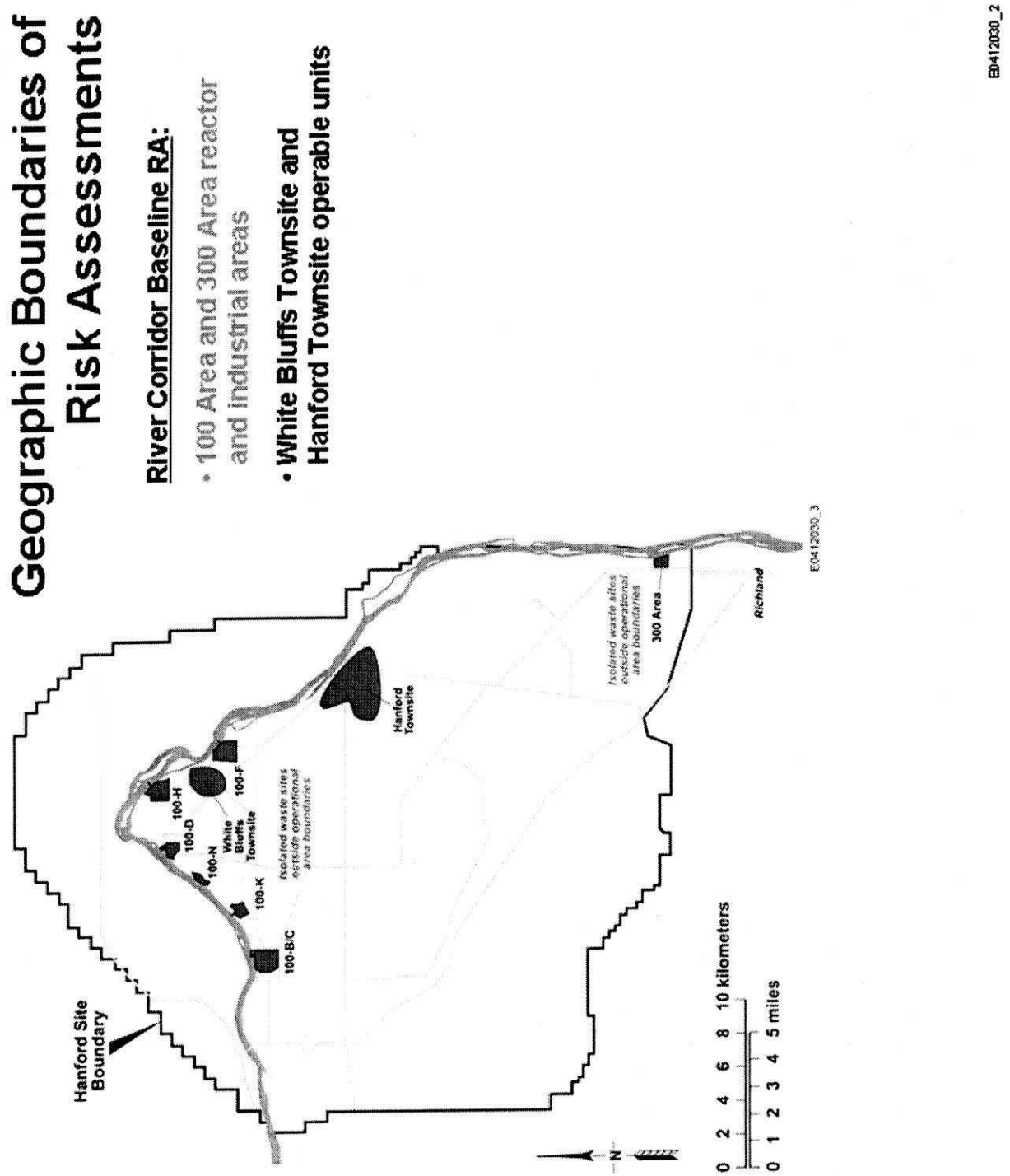
CVP No.	Revision/ Draft No.	Date Published	No. Copies	Title
CVP-99-00008	Rev. 0	Feb 2000	1	Cleanup Verification Package for the 116-B-12 Seal Pit Crib
CVP-99-00007	Rev. 0	August 2000	1	Cleanup Verification Package for the 116-D-7 Retention Basin
CVP-99-00006	Rev. 0	Nov 1999	1	Cleanup Verification Package for the 116-DR-9 Retention Basin
CVP-99-00005	Rev. 0	Dec 1999	1	Cleanup Verification Package for the 1607-D2 Septic Tank
CVP-99-00004	Rev. 0	Dec 1999	1	Cleanup Verification Package for the 116-C-5 Retention Basin
CVP-99-00003	Rev. 0	July 1999	1	Cleanup Verification Package for the 116-B-14 North Sludge Tank
CVP-99-00002	Rev. 0	July 1999	1	Cleanup Verification Package for the 116-B-13 South Sludge Trench
CVP-99-00001	Rev. 0	Dec 1999	1	Cleanup Verification Package for the 116-B-11 Retention Basin
CVP-98-00006	Rev. 0	Jan 1999	1	Cleanup Verification Package for the 116-C-1 Process Effluent Trench
CVP-98-00005	Rev. 0	March 1999	1	Cleanup Verification Package for the 1607-D2:1 Abandoned Tile Field
CVP-98-00004	Rev. 0	March 1999	1	Cleanup Verification Package for the 100-D-4 Sludge Pit
CVP-98-00003	Rev. 0	March 1999	1	Cleanup Verification Package for the 100-D-20 Sludge Pit
CVP-98-00002	Rev. 0	March 1999	1	Cleanup Verification Package for the 100-D-21 Sludge Pit
CVP-98-00001	Rev. 0	March 1999	1	Cleanup Verification Package for the 100-D-22 Sludge Pit

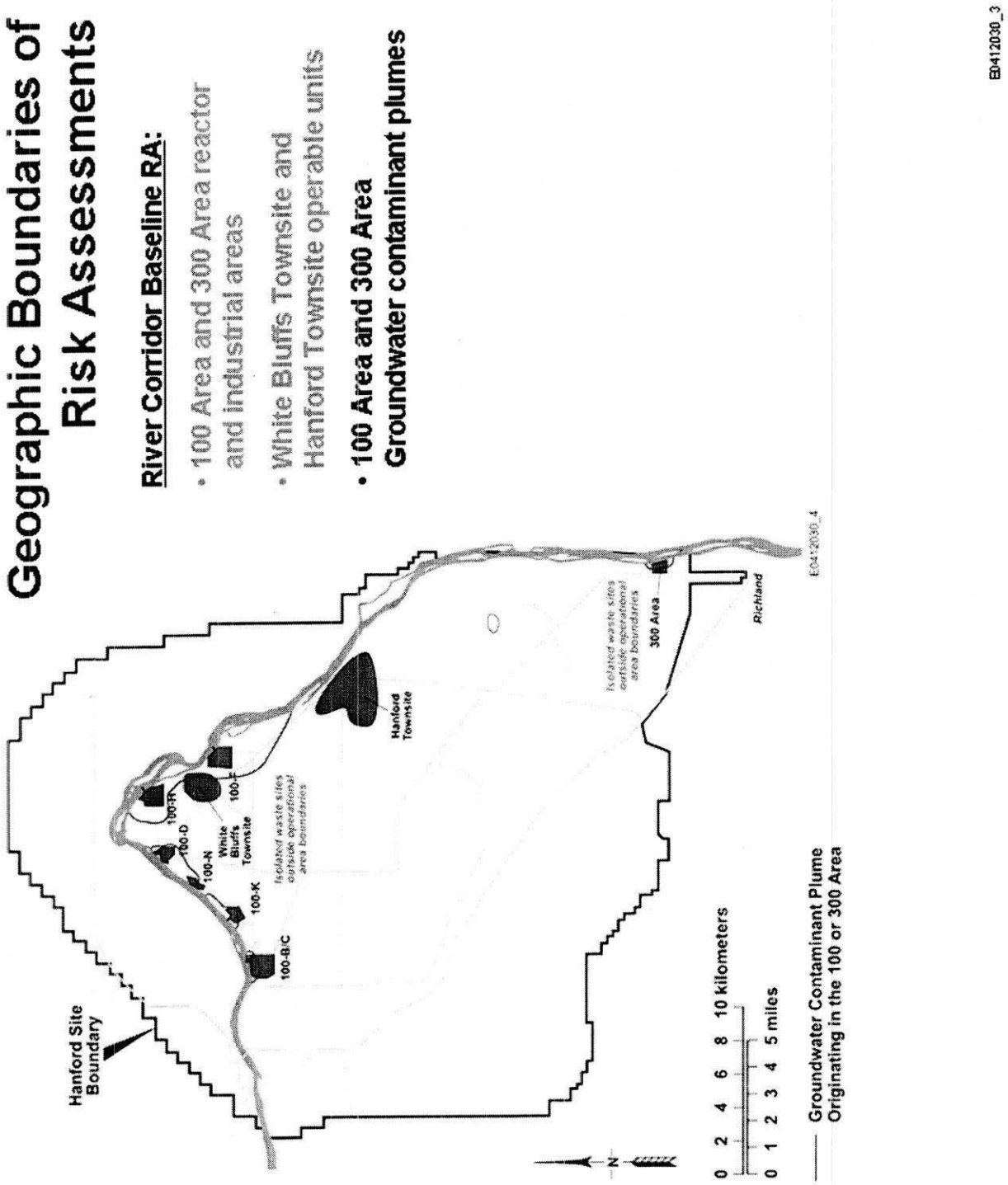
CVP = cleanup verification package

APPENDIX C

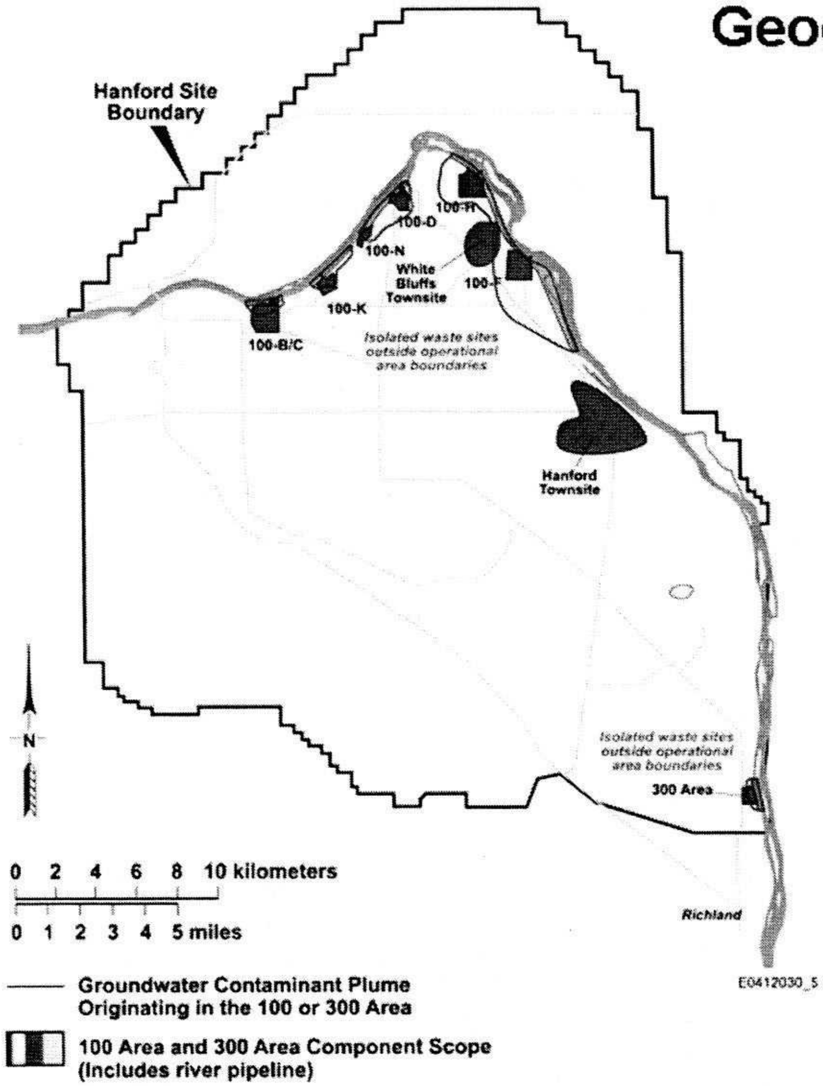
MAPS OF GEOGRAPHIC BOUNDARIES OF RISK ASSESSMENTS


Geographic Boundaries of Risk Assessments
River Corridor Baseline RA:
• 100 Area and 300 Area reactor and industrial areas
EB4120330_1
EB4120330_2
Hanford Site Boundary
100-B/C
100-K
100-N
100-D
100-H
100-F
Isolated waste sites outside operational area boundaries
Isolated waste sites outside operational area boundaries
300 Area
Richland
N
0 2 4 6 8 10 kilometers
0 1 2 3 4 5 miles


Geographic Boundaries of Risk Assessments
River Corridor Baseline RA:
• 100 Area and 300 Area reactor and industrial areas
• White Bluffs Townsite and Hanford Townsite operable units
EB412030_2
Hanford Site Boundary
100-B/C
100-K
100-N
100-D
100-H
White Bluffs Townsite
100-F
Isolated waste sites outside operational area boundaries
Hanford Townsite
Isolated waste sites outside operational area boundaries
300 Area
Richland
EB412030_3
N
0 2 4 6 8 10 kilometers
0 1 2 3 4 5 miles


Geographic Boundaries of Risk Assessments
River Corridor Baseline RA:
• 100 Area and 300 Area reactor and industrial areas
• White Bluffs Townsite and Hanford Townsite operable units
• 100 Area and 300 Area Groundwater contaminant plumes
E0412030_3
E0412030_4
Hanford Site Boundary
100-B/C
100-K
100-N
100-D
100-H
100-F
White Bluffs Townsite
Isolated waste sites outside operational area boundaries
Hanford Townsite
Isolated waste sites outside operational area boundaries
300 Area
Richland
N
0 2 4 6 8 10 kilometers
0 1 2 3 4 5 miles
Groundwater Contaminant Plume Originating in the 100 or 300 Area

Geographic Boundaries of Risk Assessments

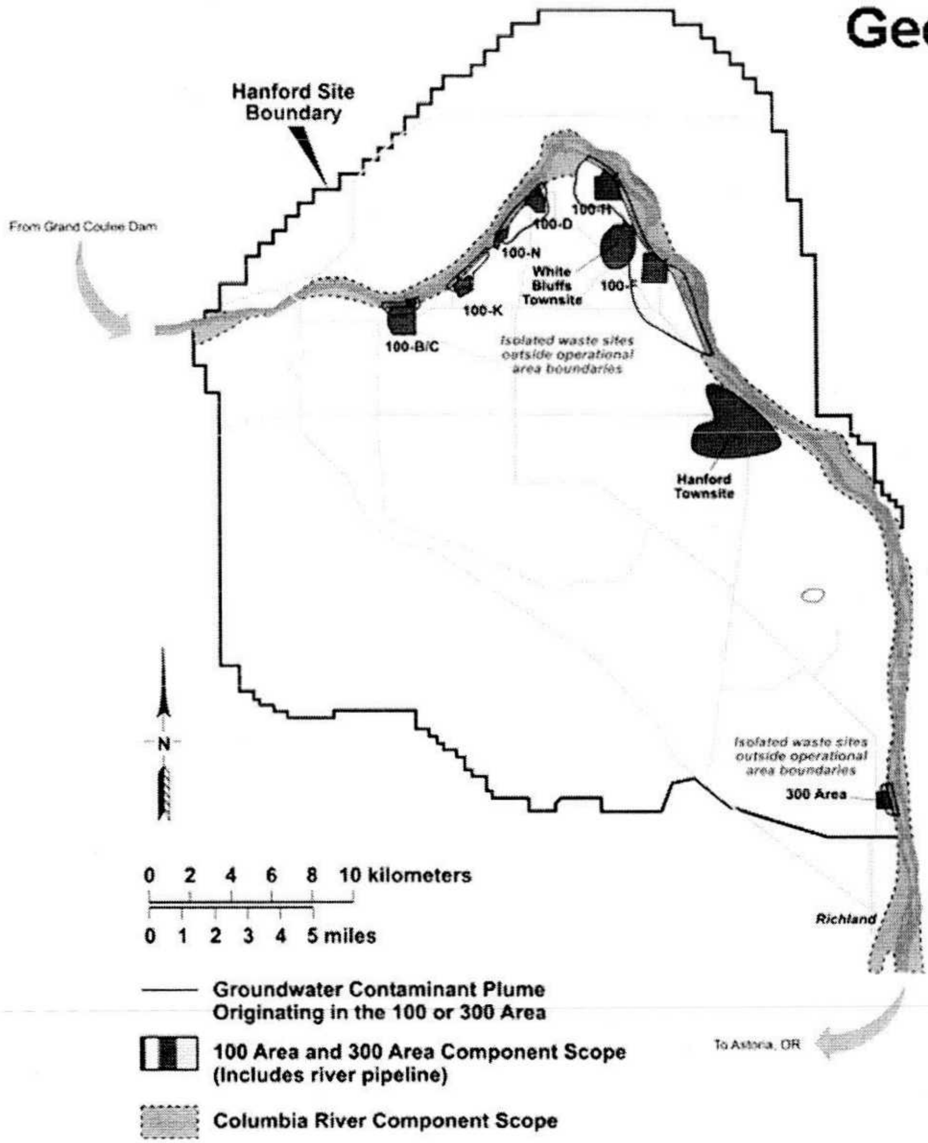


River Corridor Baseline RA:

- 100 Area and 300 Area reactor and industrial areas
- White Bluffs Townsite and Hanford Townsite operable units
- 100 Area and 300 Area Groundwater contaminant plumes
- **Operational and shoreline areas included in 100 Area and 300 Area Component scope**
  (Note: 100-B/C and 100-N Areas riparian and near-shore zones are addressed in separate assessments but results will be included.)

E0412030_4

Geographic Boundaries of Risk Assessments

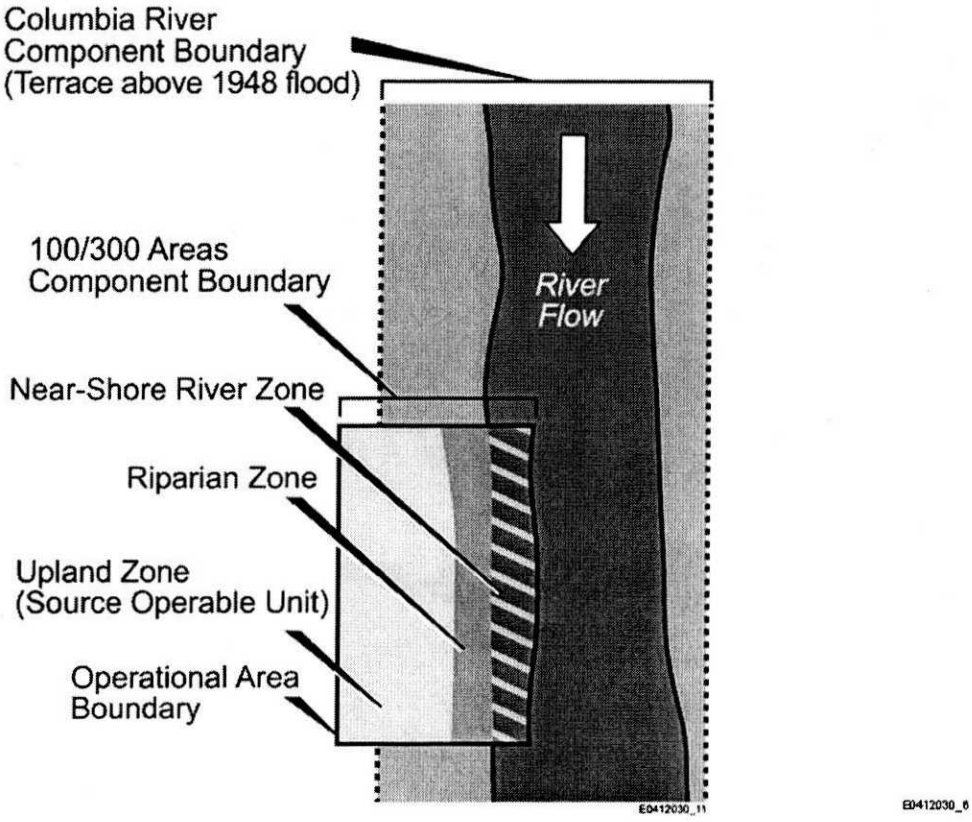


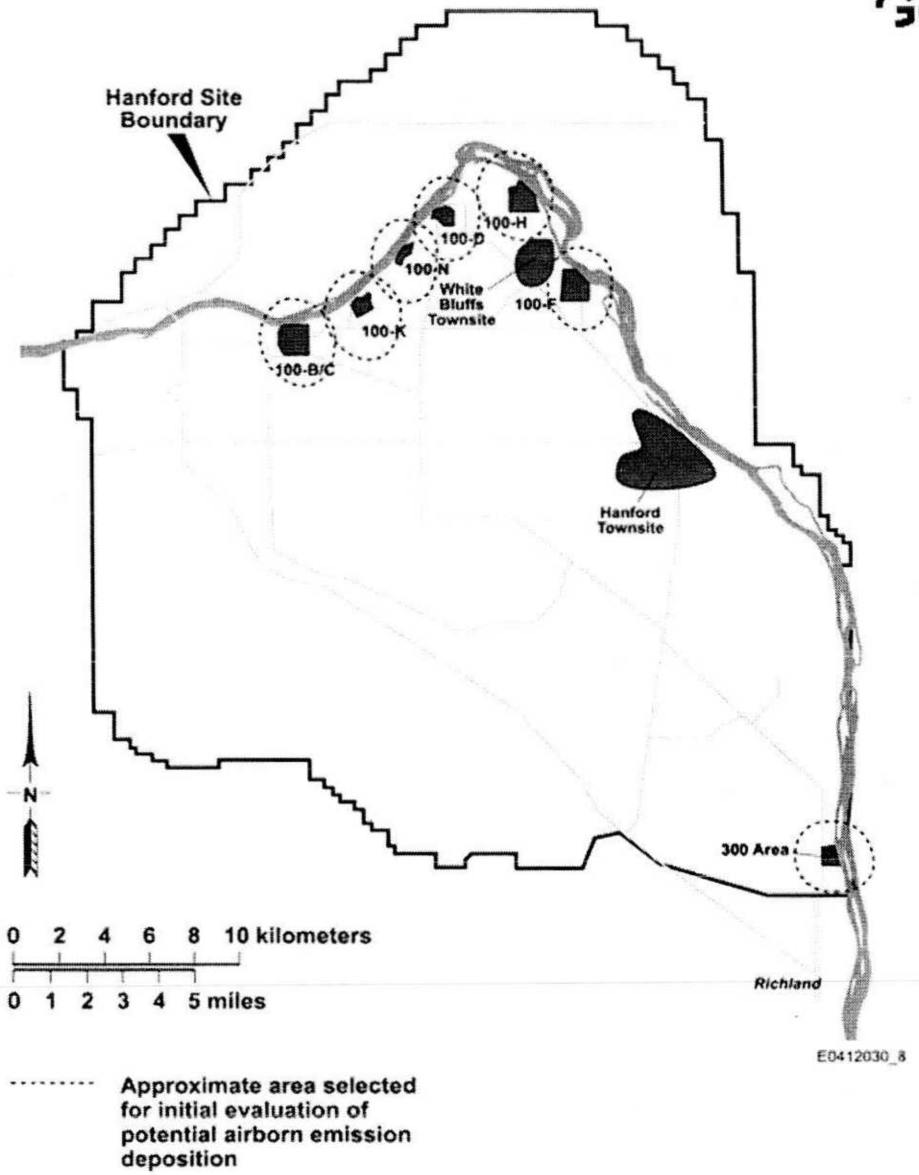
River Corridor Baseline RA:

- 100 Area and 300 Area reactor and industrial areas
- White Bluffs Townsite and Hanford Townsite operable units
- 100 Area and 300 Area Groundwater contaminant plumes
- Operational and shoreline areas included in 100 Area and 300 Area Component scope
  (Note: 100-B/C and 100-N Areas riparian and near-shore zones are addressed in separate assessments but results will be included.)
- **Columbia River Component**

E0412030_5

Overlap of 100 and 300 Area Component Relative to Columbia River Component - Aerial





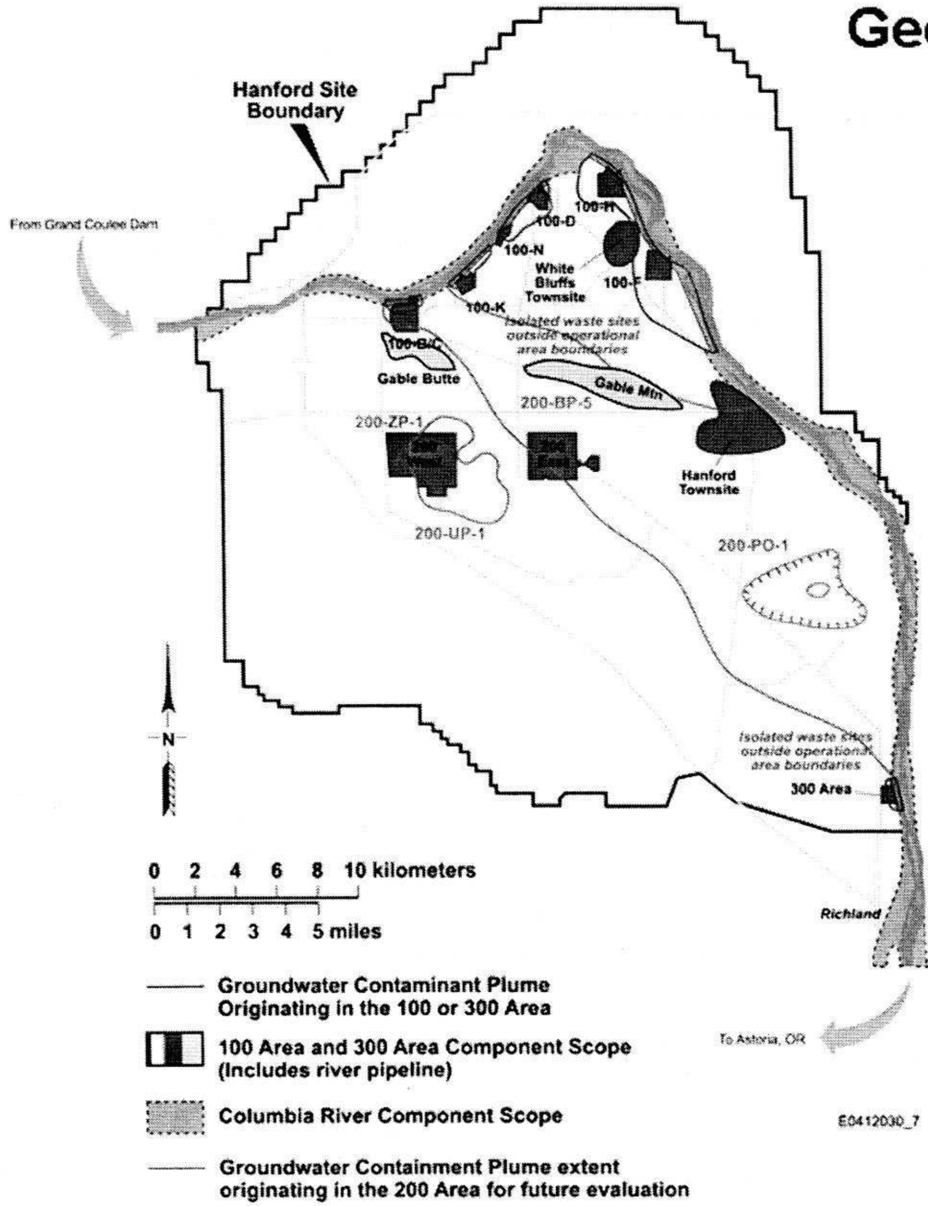
Geographic Boundaries of Risk Assessments

River Corridor Baseline RA:

- 100 Area and 300 Area reactor and industrial areas
- White Bluffs Townsite and Hanford Townsite operable units
- 100 Area and 300 Area Groundwater contaminant plumes
- Operational and shoreline areas included in 100 Area and 300 Area Component scope
  (Note: 100-B/C and 100-N Areas riparian and near-shore zones are addressed in separate assessments but results will be included.)
- Columbia River Component
- **Potential Airborne Contaminant Deposition Study Areas**

E0412030_7

Geographic Boundaries of Risk Assessments



River Corridor Baseline RA:

- 100 Area and 300 Area reactor and industrial areas
- White Bluffs Townsite and Hanford Townsite operable units
- 100 Area and 300 Area Groundwater contaminant plumes
- Operational and shoreline areas included in 100 Area and 300 Area Component scope
  (Note: 100-B/C and 100-N Areas riparian and near-shore zones are addressed in separate assessments but results will be included.)
- Columbia River Component scope
- Potential Airborne Contaminant Deposition Study Areas

200 Area Groundwater OU:

- **Approximate location and extent of current groundwater plumes**

E0412030_8

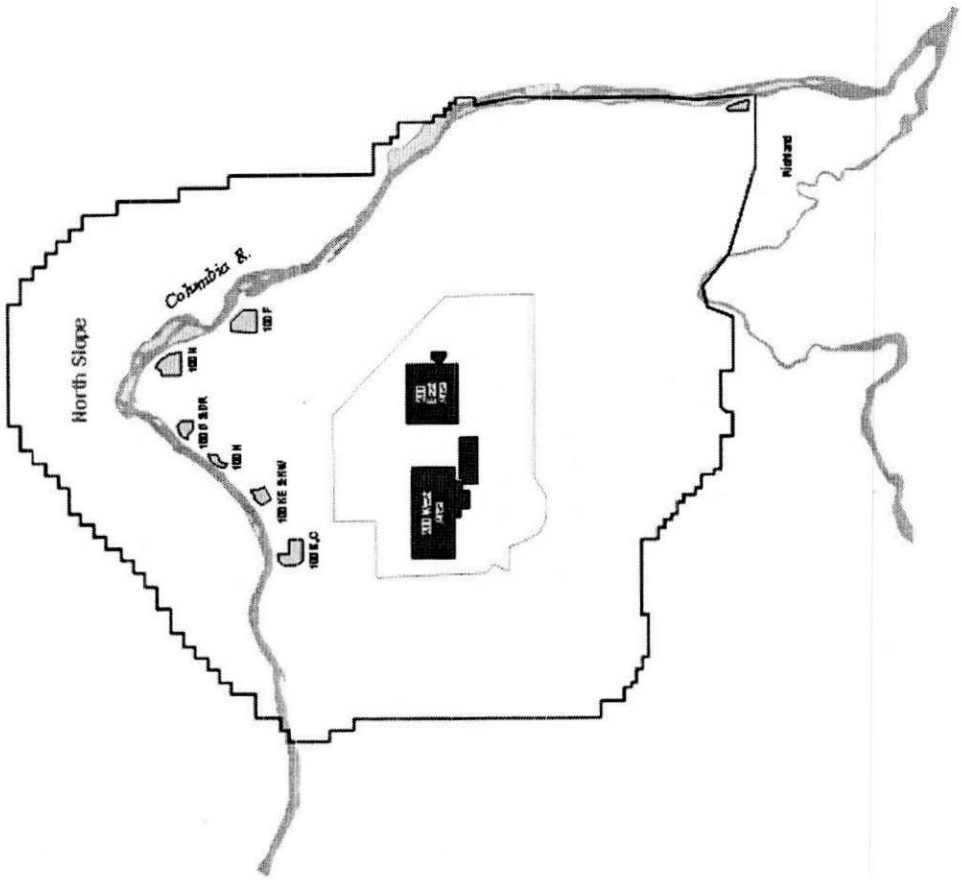
Geographic Boundaries of Risk Assessments

Central Plateau Waste Sites:

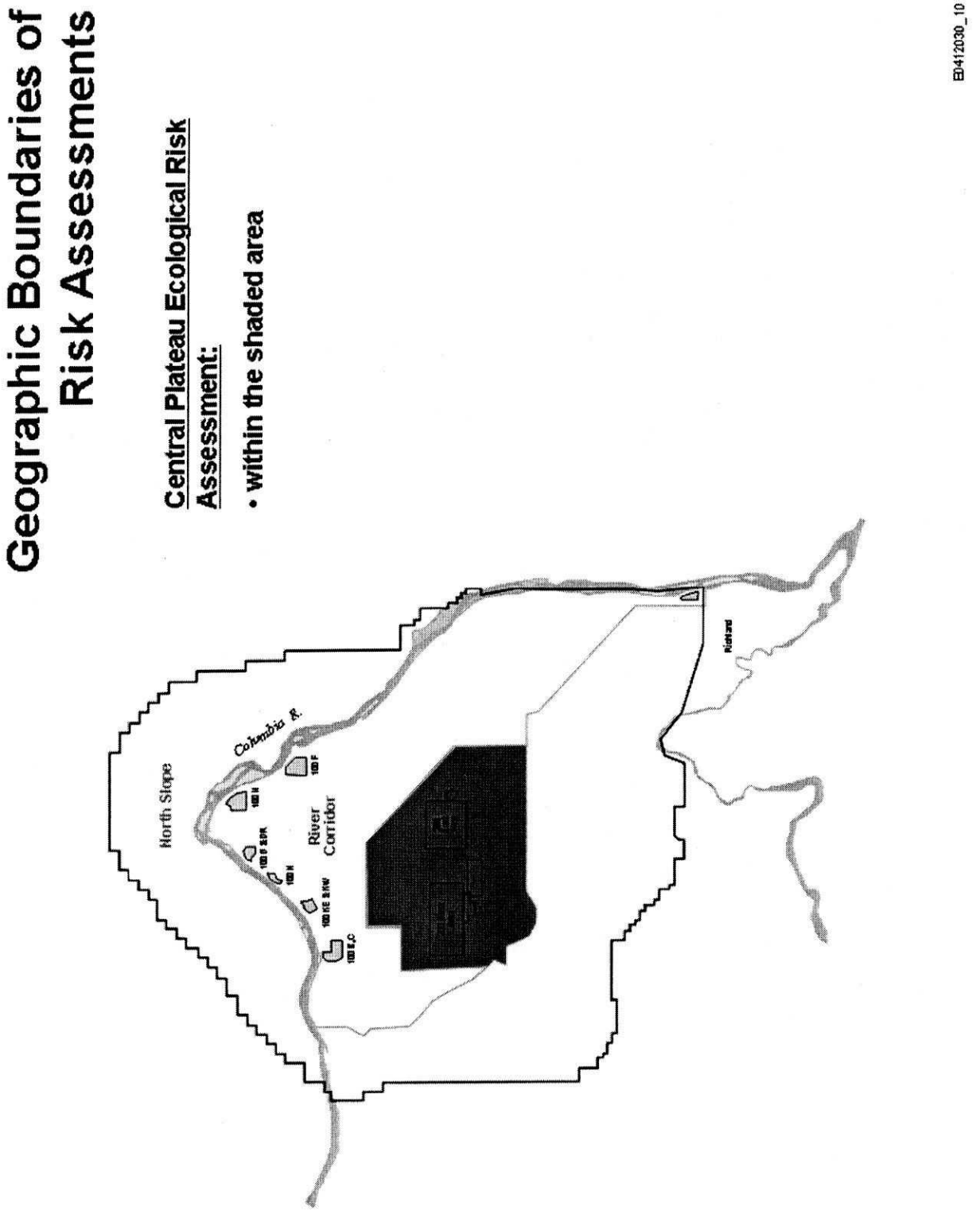
- generally within the 200 West and 200 East Areas

ORP Activities:

- generally within the 200 West and 200 East Areas



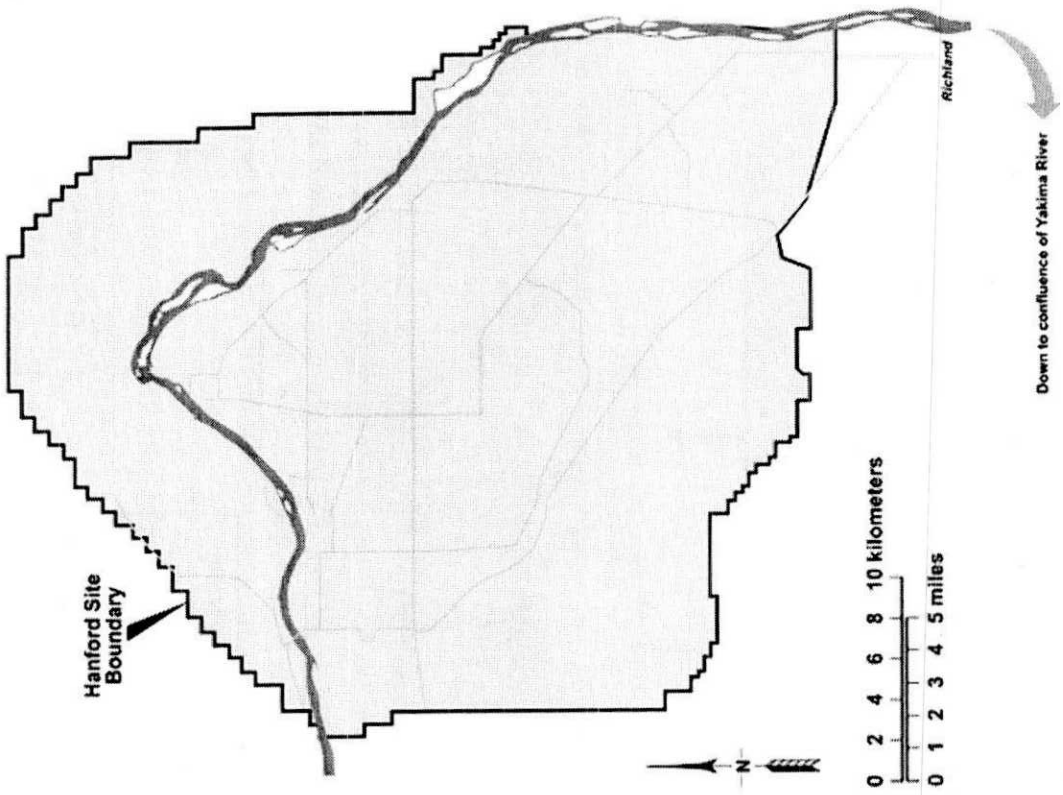
EB4120301_9


Geographic Boundaries of Risk Assessments
Central Plateau Ecological Risk Assessment:
• within the shaded area
EB412030_10
Columbia R.
North Slope
River Corridor
Richland

Geographic Boundaries of Risk Assessments

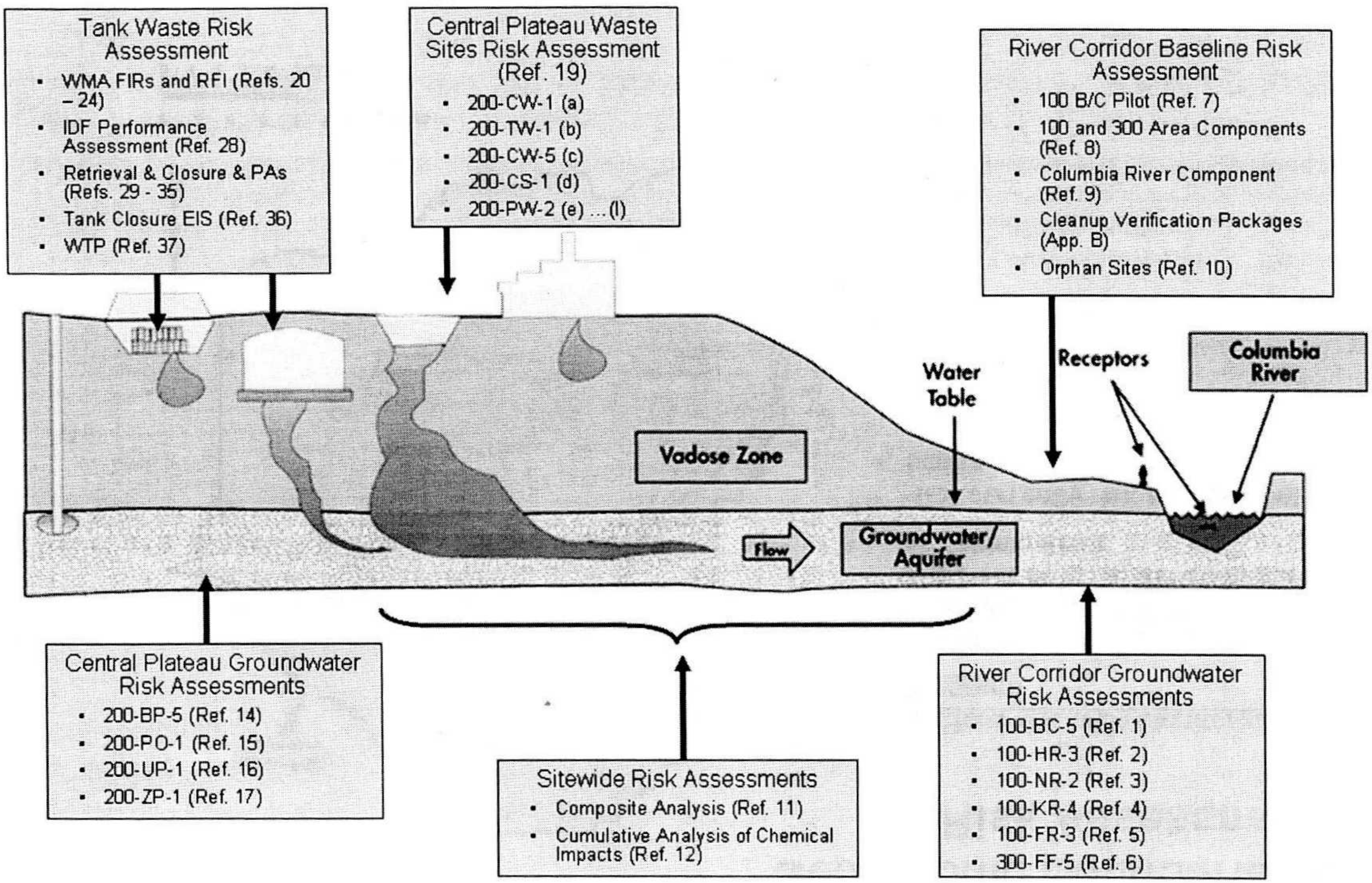
Hanford Site-wide Monitoring Program:

- **Collecting monitoring data throughout entire Hanford site and river down to the confluence of Yakima River**
- **Not currently risk assessment scope**



Integration among Hanford Site Human Health Risk Assessments

(Numbers in Parentheses correspond to Risk Assessments listed in Appendix A)



Integration among Hanford Site Ecological Risk Assessments
(Numbers in Parentheses correspond to Risk Assessments listed in Appendix A)
Central Plateau Ecological Risk Assessment (Ref. 18)
Purpose
Eco risk inputs to remedial action decisions (TPA Master Milestone). Do ecological risks require remedial actions?
Scope
Risk to terrestrial ecological receptors; shallow soil 0 – 15ft.
CERCLA waste sites and habitat in Central Plateau (inside and outside of Core Zone).
Hanford Site-Wide Monitoring Program (Ref. 13)
Purpose
Do ecosystems outside the Core Zone and River Corridor require remedial actions?
Scope
Exposure to terrestrial ecological receptors.
Entire Hanford Site, including interspersed areas not included in existing Operable Units.
River Corridor Baseline Risk Assessment (Refs. 7,8,9)
Purpose
Evaluate protectiveness of current remedial actions.
Scope
Ecological receptors within upland, riparian, and near-shore environments of the 100 and 300 Areas.
Columbia River impacts.
Includes Human Health impacts also.
Central Plateau
Other Areas
Water Table
Receptors
Columbia River
Ecological Risk Assessments & Data Collection
Vadose Zone
River Corridor
Flow
Groundwater/ Aquifer
Sitewide Risk Assessment s
(Refs. 11 and 12)
Purpose
What is the cumulative impact from all remaining inventories at Hanford (including chemicals)?
Scope
Includes both ecological and human receptors.
Includes entire Hanford Site and Columbia River.
Evaluates impact of contaminant transport from Central Plateau to River Corridor.

DISTRIBUTION

U.S. Department of Energy
Richland Operations Office/Office of River Protection

J. P. Sands	A3-04
S. A. Wiegman	H6-60
E. G. Dagan	A5-15
P. F. Dunigan	A5-15
T. W. Ferns	A5-15
B. L. Foley	A6-38
R. D. Hildebrand	A6-38
E. V. Hiskes	A4-52
R. W. Lober	H6-60
R. A. Quintero	H6-60
P. D. Rittman	E6-17
K. M. Thompson	A6-38
A. C. Tortoso	A6-38
D. C. Ward	A2-17
D. A. Weeks	A4-52
T. W. Ferns	A5-15
S. H. Wisness	A3-04
J. Zeisloft	A3-04

CH2M HILL Hanford Group, Inc.

F. J. Anderson	E6-35
J. W. Badden	H6-03
M. Connelly	E6-35
F. M. Mann	E6-35

Fluor Hanford, Inc.

R. G. Bauer	E6-35
M. E. Byrnes	E6-35
V. G. Johnson	E6-35
M. E. Todd	E6-35

Distribution

Pacific Northwest National Laboratory

R.W. Bryce	K6-96
R. L. Dirkes	K6-75
J. S. Fruchter	K6-96
T. G. Naymik	K6-96
R. E. Peterson	K6-96
T. M. Poston	K6-96
M. B. Triplett	K6-52

ERC Team

K. A. Gano, BHI	H0-23
T. A. Lee, CHI	H0-23
J. K. Linville, CHI	H0-23
T. E. Marceau, BHI	H0-23
D. L. Morgans, CH2M	H0-23
S. K. Muns, CHI	H9-02
D. D. Teel	H0-23
J. E. Thomson, CHI	H0-23
S. G. Weiss, BHI	H0-23

Document and Information Services (3)	H0-30
DOE-RL Public Reading Room	H2-53
Hanford Technical Library	P8-55
Administrative Record	H6-08